HMI Touch Panel Development Kit

CUPANEL™

User's Manual

2012-02-27

"Everything for Embedded Control"

COMFILE TECHNOLOGY

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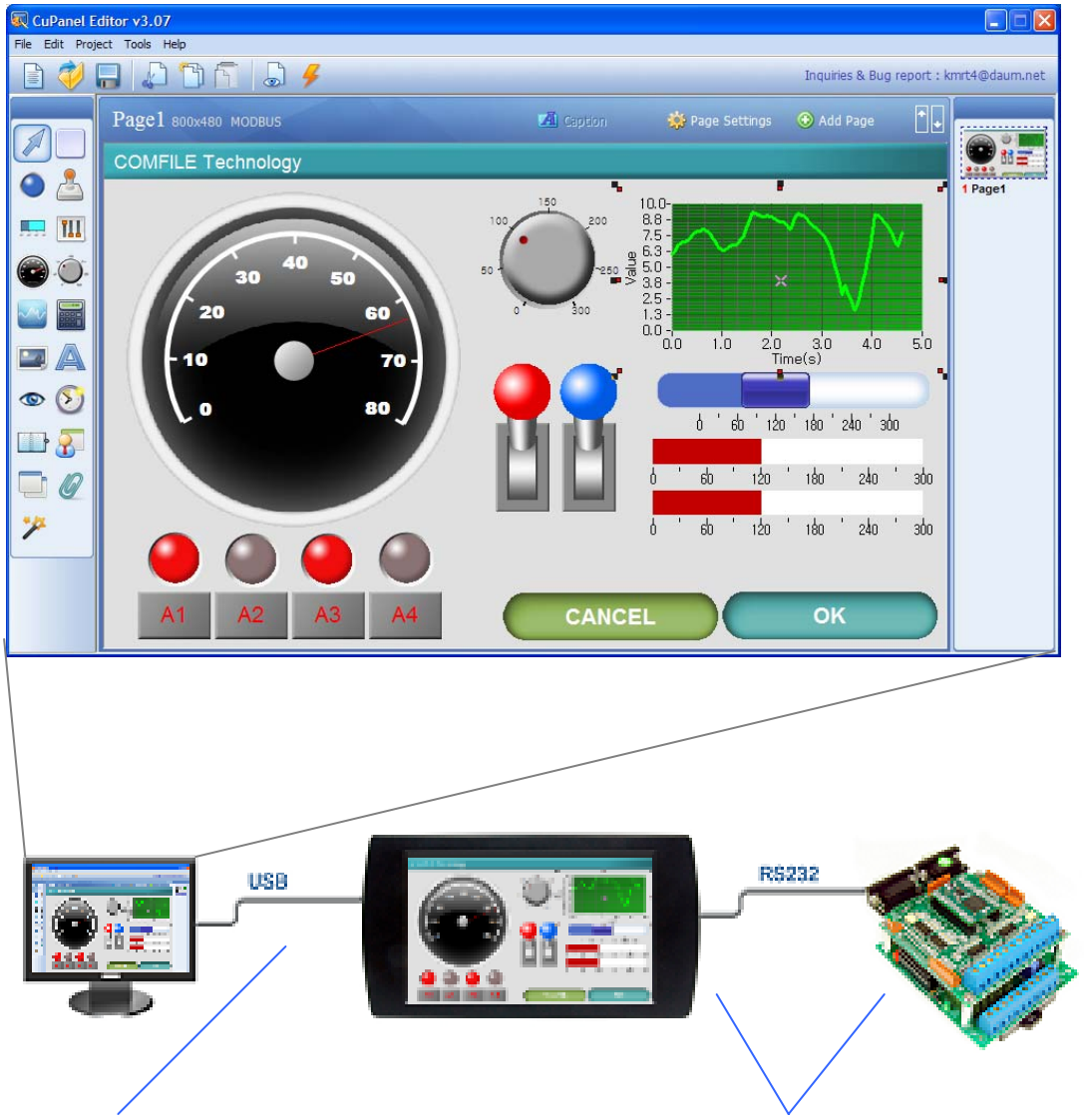
Chapter 1
Overview

Introduction

The CUPANEL is an HMI (Human-Machine Interface) touch panel development kit. It includes an HMI touch controller and a WYSIWYG development tool (the CUPANEL Editor) for "programming" the touch controller. However, *programming* in the classical sense of the word is not required, and this is what makes the CUPANEL so unique. Using the powerful CUPANEL Editor and a personal computer, users can create professional human-machine interfaces by "drawing" controls (i.e. buttons, gauges, graphs, etc…) on a canvas representing the touch controller's screen. These controls' appearance and functionality can then be customized in great detail by selecting from a feature-rich set of menu options that include RS-232 communication.

1. **Design an HMI user interface and configure the RS-232 communication settings with the CUPANEL Editor.**



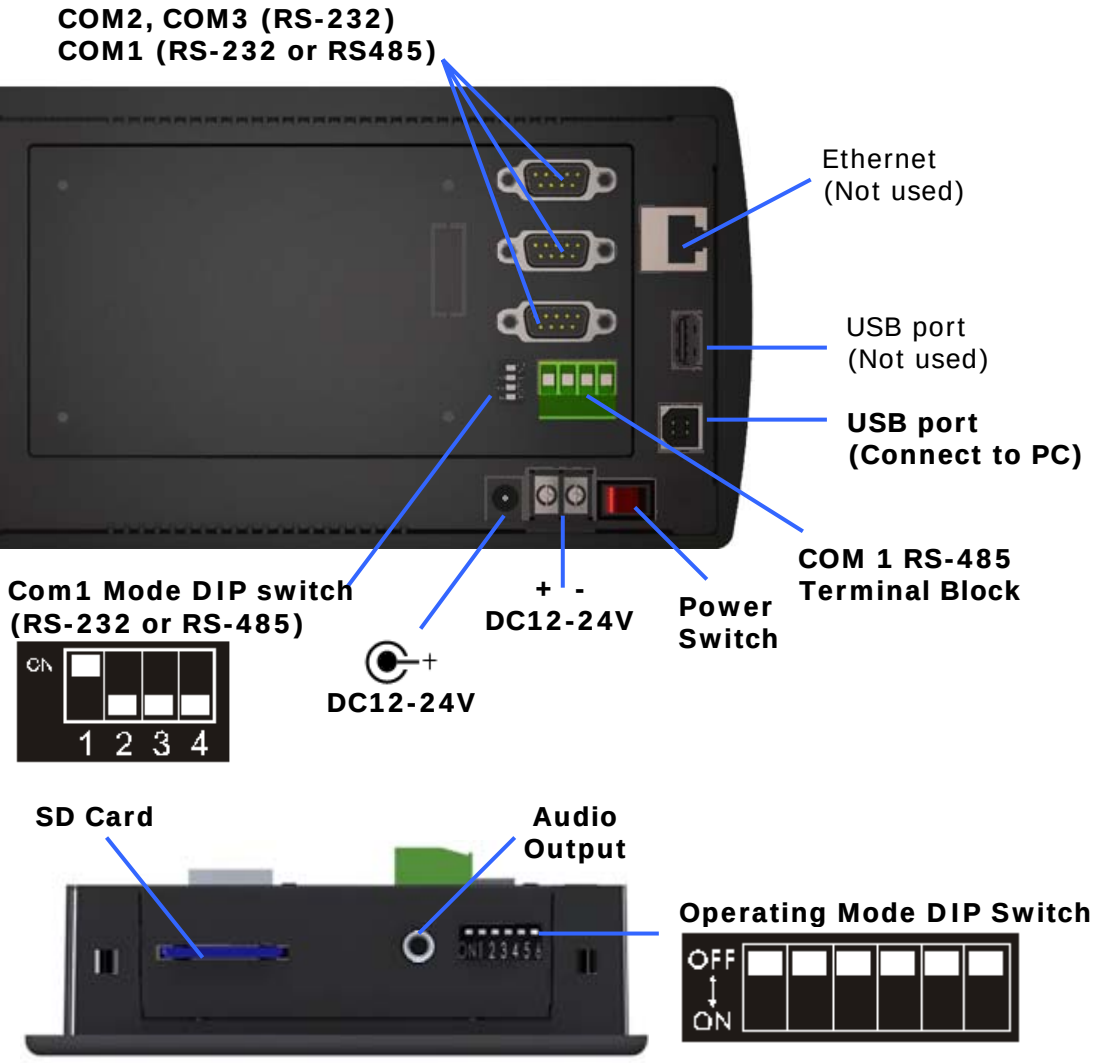
2. **Use the CUPANEL Editor to download the interface to the CUPANEL touch controller.**

3. **Execute the user interface on the touch controller as a standalone program that can communicate with and control a PLC.**

Once the interface is created and the controls' communication settings are configured in the CUPANEL Editor, the project can be downloaded to the touch panel and executed as a standalone program that can communicate with and control a PLC (Programmable Logic Controller).

The CUPANEL touch controller features an 800x480 color touch screen capable of receiving input from a human user by touching the screen, and displaying colorful output.

The rear and side panels feature several interfaces (RS-232/485 Serial Ports, USB, Ethernet, Audio, SD Card) for interfacing with a variety of electronic devices and electronic media. But please note that at this time not all hardware features can be taken advantage of by the CUPANEL software.

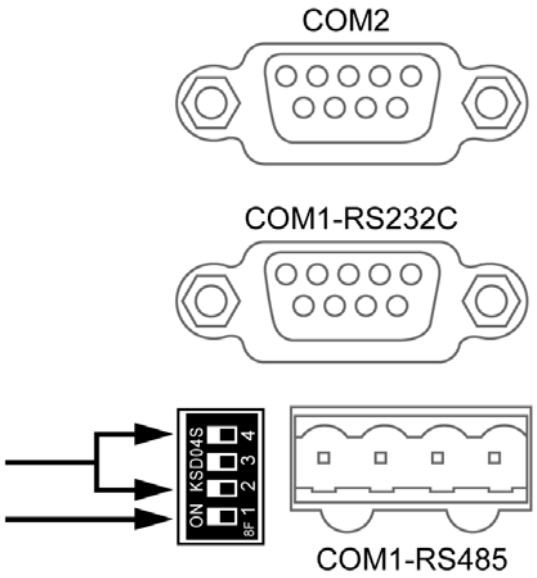


RS-232/485 Connections

COM1 can be used as either and RS-232 port or an RS-485 port. It is configured using the dip switch next to COM1.

RS485 Mode Sel.		
S/W No.	**ON**	**OFF**
4	Term Res.	N.C.
3	-Bias	N.C.
2	+Bias	N.C.

COM1 Mode Sel.		
S/W No.	**ON**	**OFF**
1	RS232C	RS485



COM2 and COM3 can only be used for RS-232 communication. See the CUPANEL hardware manual for more information.

The CUPANEL currently comes in four different models:

Model	Description
 CPB070A	-7" Color TFT LCD Touch Screen -2.6 Million Colors -Bezel-type Case (Indoor Use) -2GB User Program Space (SD Card) -CE, KCC, FCC Certified
 CPW070A	-7" Color TFT LCD Touch Screen -2.6 Million Colors -Waterproof Front Panel (Indoor & Outdoor Use) -2GB User Program Space (SD Card) -CE, KCC, FCC Certified
 CPB102A	-10.2" Color TFT LCD Touch Screen -2.6 Million Colors -Bezel-type Case (Indoor Use) -2GB User Program Space (SD Card) -CE, KCC, FCC Certified
 CPW102A	-10.2" Color TFT LCD Touch Screen -2.6 Million Colors -Waterproof Front Panel (Indoor & Outdoor Use) -2GB User Program Space (SD Card) -CE, KCC, FCC Certified

* We recommend limiting a CuPanel project to 10~15 pages and 15~20 controls per page.

Chapter 2
Getting Started

This chapter will explain how to connect the CUPANEL touch controller to a PC and PLC, install the necessary software, and create a sample user interface.

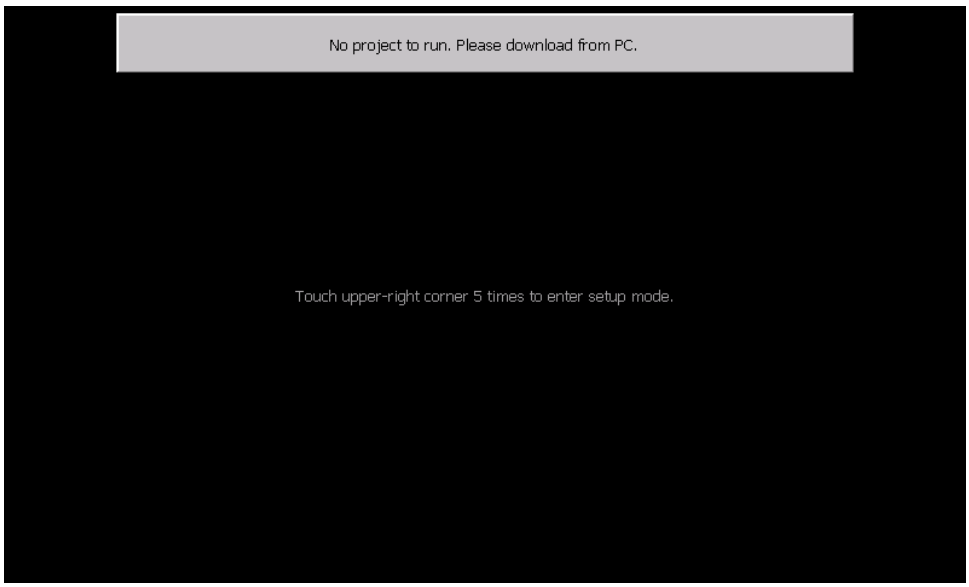
Connecting the CUPANEL to a Personal Computer (PC)

In order to create user interfaces for the CUPANEL you will need to connect the CUPANEL to a desktop, laptop, or other type of personal computer.

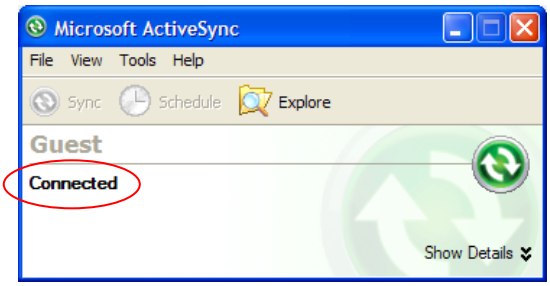
To connect a PC to the CUPANEL, Microsoft's ActiveSync (Windows XP) or Windows Mobile Device Center (Windows Vista and Windows 7) must be installed on your PC. If your PC is running Windows XP, follow the ActiveSync installation instructions in the Software Installation chapter. If your PC is running Windows Vista or Windows 7, follow the Windows Mobile Device Center installation instructions in the Software Installation chapter.

1. Once ActiveSync or Windows Mobile Device Center is installed, turn the CUPANEL on, and connect the CUPANEL touch controller to the PC with a USB Cable.

2. Turn on the touch controller and a dialog box will appear asking you to make a language selection. Make your choice and click the "OK" button.



3. If no user interface project has yet been downloaded to the CUPANEL, the CUPANEL will display the screen above. This screen will be discussed in the section "Configuring the Touch Panel".



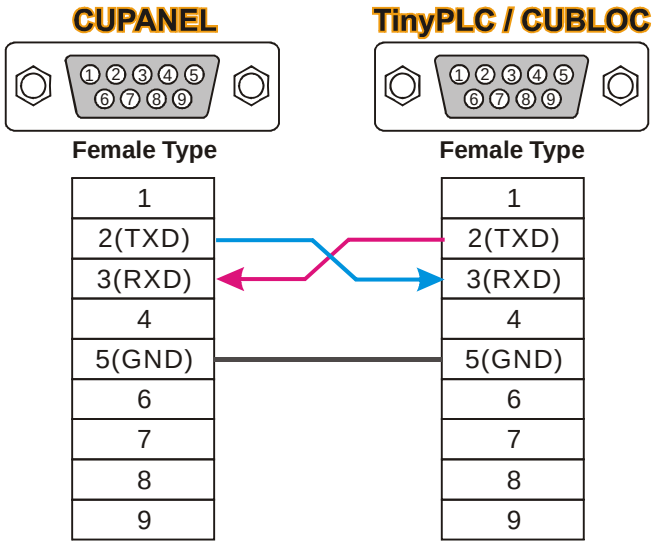
Windows Mobile Device Center
Home
Windows Mobile
Set up your device
Get Outlook contacts, calendar, e-mail and other information on your device.
Connect without setting up your device
Connected

4. With the CUPANEL powered on and properly connected to the PC, ActiveSync or Windows Mobile Device Center will show a status of "Connected". The CUPANEL and the PC will then be able to communicate with one another.

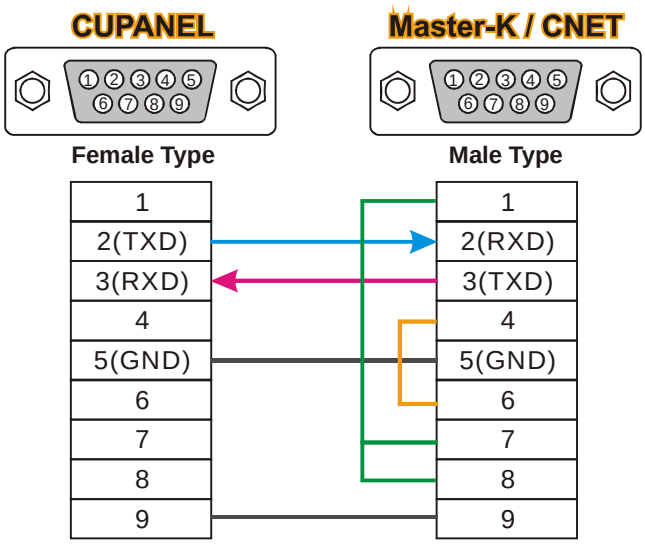
Connecting the CUPANEL to a PLC

Connecting the CUPANEL touch controller to a PC will enable the ability to create an HMI user interface project using the CUPANEL Editor and download it to the CUPANEL touch controller, but eventually the CUPANEL touch controller will need to be interfaced to a PLC.

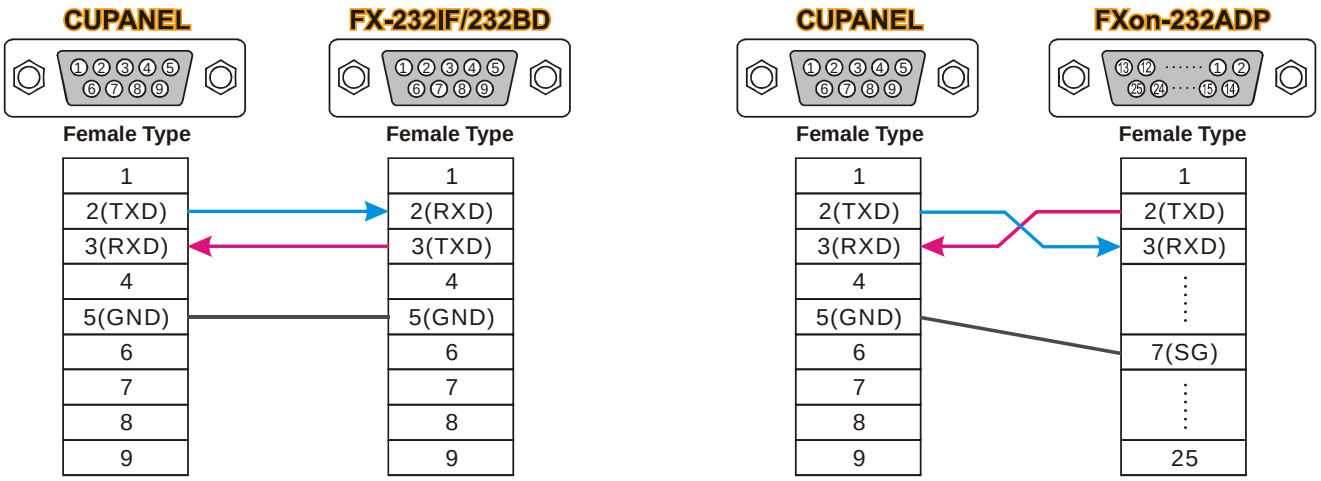
The touch controller can be connected to a PLC using any one of its three serial ports, and supports three different communication protocols: Modbus, LS Master-K (CNET), and Mitsubishi FX. The following diagrams illustrate the necessary connections that will need to be made for each of these different protocols.



Connecting CUPANEL to Comfile Technology's TinyPLC or CUBLOC (Modbus).



Connecting CUPANEL to an LS Master-K (CNET) device.



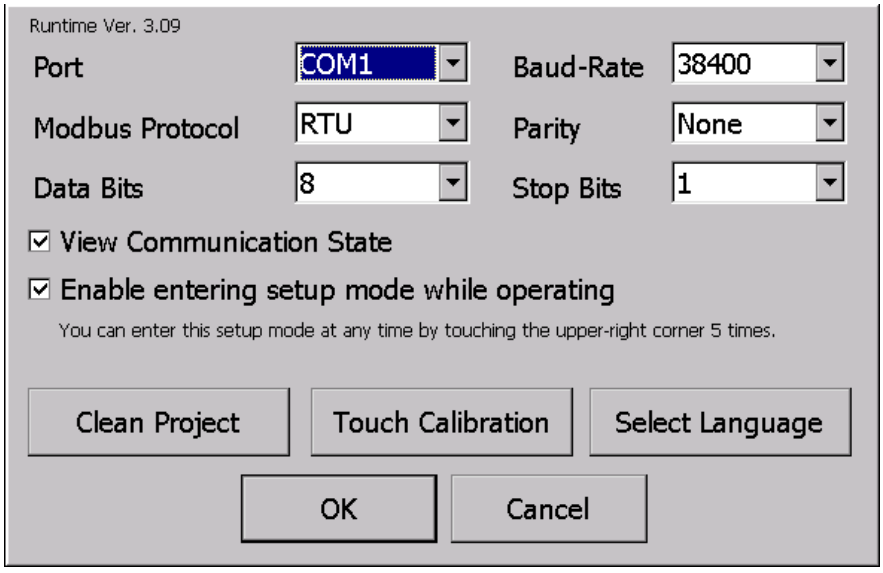
Connecting the CUPANEL to a Mitsubishi FX device.

Configuring the Touch Panel

Once a physical connection is made between the CUPANEL's touch panel and a PLC, the touch panel's RS-232 settings and other features can be configured.

No project to run. Please download from PC.
Touch here 5 times to enter setup mode.
Touch upper-right corner 5 times to enter setup mode.

1. Turn on the CUPANEL touch controller. When the screen above appears, touch the upper-right corner of the screen 5 times to enter setup mode.



2. Once in setup mode adjust the RS-232 settings to match that of your PLC or other device. In addition to the RS-232 settings, the following settings/features can also be configured.

    a. View Communication State – Check this checkbox to show a communication status message in the upper-left corner of the screen.
    b. Enable entering setup mode while operating – If checked, this feature enables the ability to enter setup mode at any time by touching the upper-right corner of the screen 5 times. If this is not checked, you scan still enter setup mode by touching anywhere on the screen when the CUPANEL splash screen appears on startup.
    c. Clean Project – Removes any projects that have been downloaded to the touch panel
    d. Touch Calibration – Runs the touch screen calibration application.
    e. Select Language – Displays of list of user interface languages to select from.

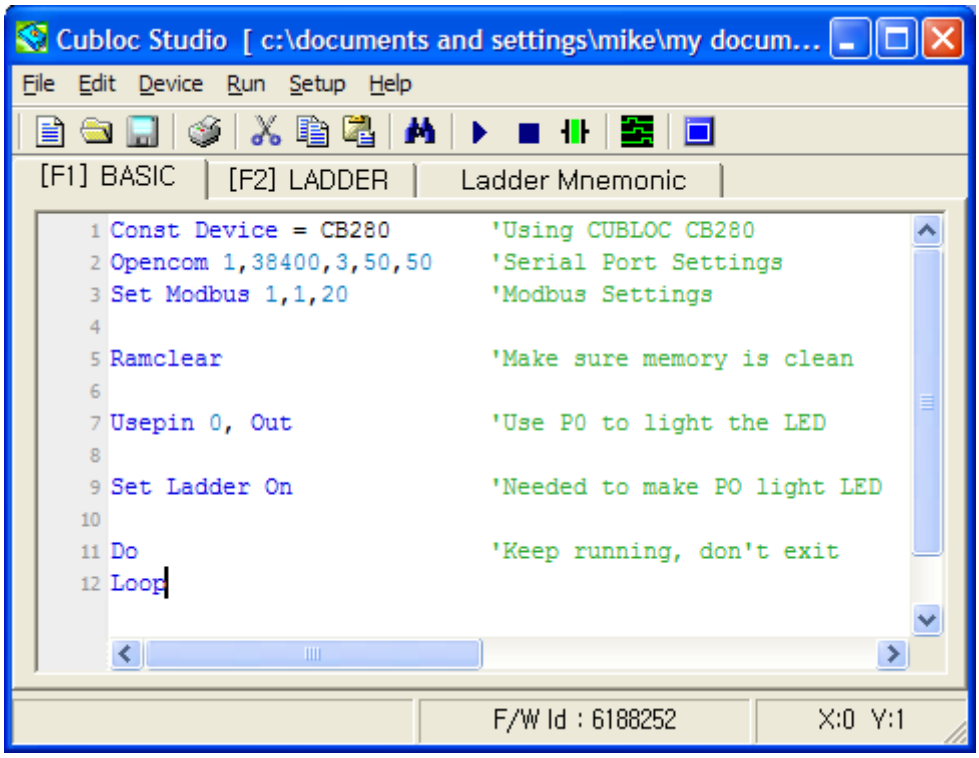
If the correct physical connections and software configurations have been made, the CUPANEL will then be able to communicate with a PLC.

Creating a User Interface

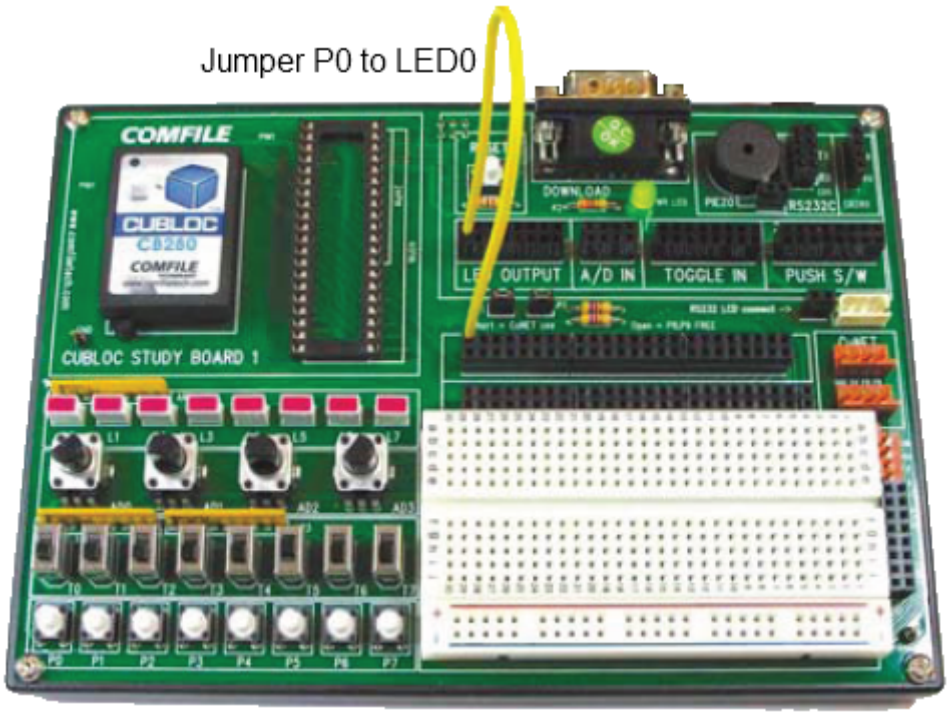
The previous sections explained how to connect the CUPANEL touch controller to a PC and a PLC. This section will explain how to create a very simple HMI user interface, download it to the CUPANEL touch controller, and execute it as a standalone program that communicates with the PLC. This demonstration will use the CUBLOC CB280 and the CUBLOC study board as the PLC.

Setting Up the CUBLOC

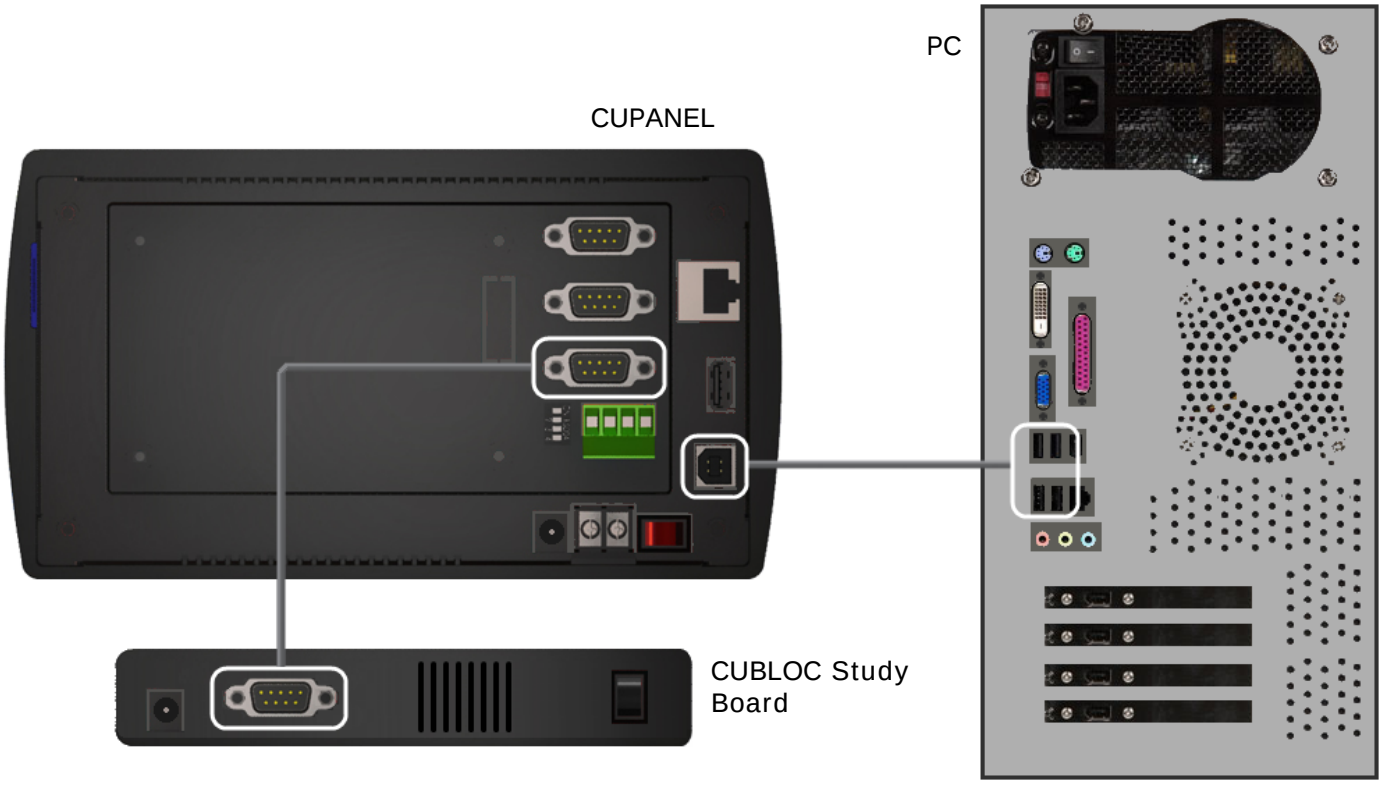
First, the CUBLOC must be programmed to receive commands from the CUPANEL. In this demonstration the program will simply toggle an LED on and off. Follow the following procedure to setup the CUBLOC.


Cubloc Studio [c:\documents and settings\mike\my docum...
File Edit Device Run Setup Help
[F1] BASIC
[F2] LADDER
Ladder Mnemonic
1 Const Device = CB280 'Using CUBLOC CB280
2 Opencom 1,38400,3,50,50 'Serial Port Settings
3 Set Modbus 1,1,20 'Modbus Settings
4
5 Ramclear 'Make sure memory is clean
6
7 Usepin 0, Out 'Use P0 to light the LED
8
9 Set Ladder On 'Needed to make P0 light LED
10
11 Do 'Keep running, don't exit
12 Loop
F/W Id : 6188252
X:0 Y:1

1. Using Cubloc Studio, program the CUBLOC as shown above. This will program the CUBLOC to communicate via RS-232 and Modbus over its serial port, and enable I/O port 0 (P0) to apply voltage to an LED. See the CUBLOC's user's manual if you wish to learn more about programming the CUBLOC.



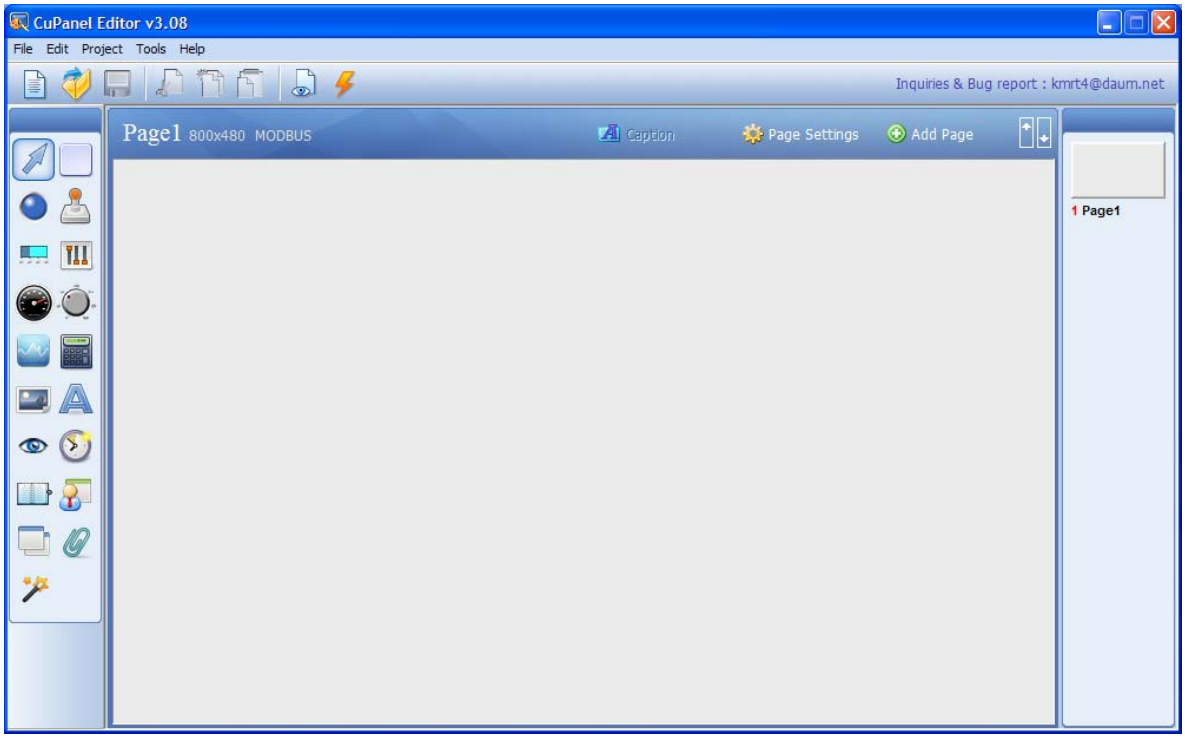
2. Connect the CUBLOC's I/O port 0 (P0) to LED 0 (LED0). The image above illustrates how to accomplish this using a yellow jumper wire and the CUBLOC Study Board. Then, when voltage is applied to P0, LED0 will light.



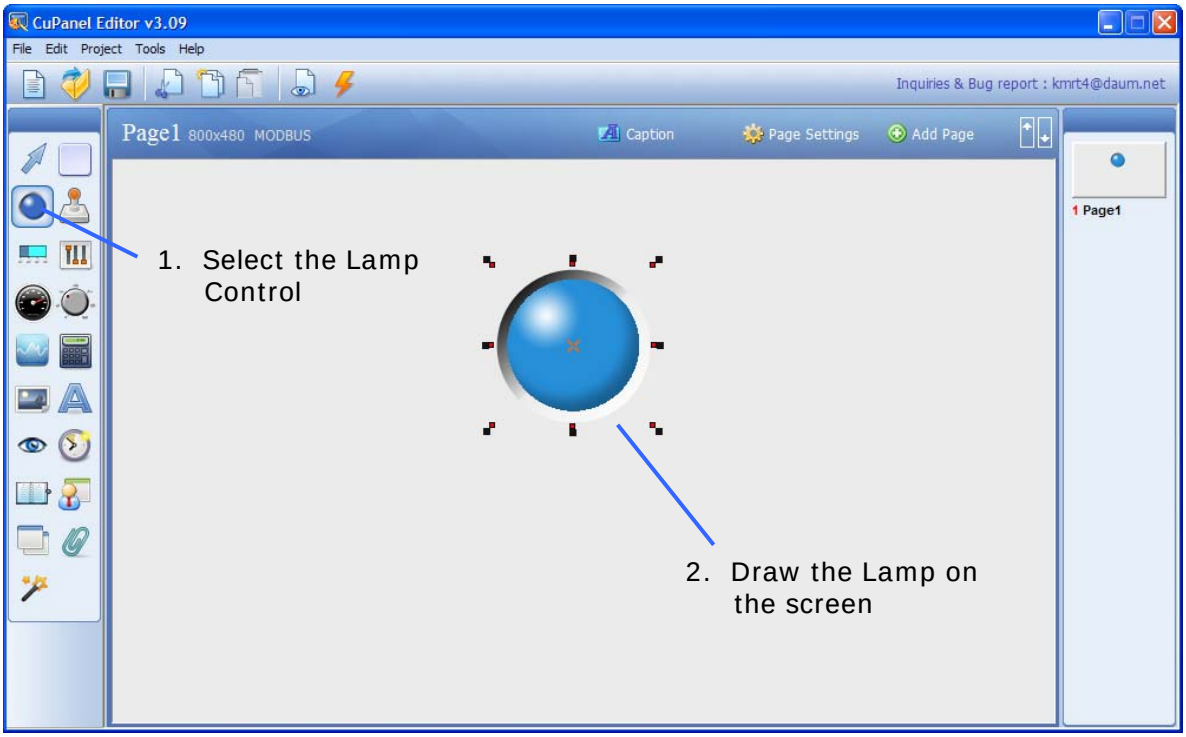
3. Connect the CUBLOC's serial port to the CUPANEL's COM1 serial port and connect the CUPANEL to a PC via USB as shown above. There will now be two connections to the CUPANEL's touch panel: a USB connection to the PC, and an RS-232 connection to the CUBLOC Study Board.

Designing and Configuring the HMI User Interface with the CUPANEL Editor

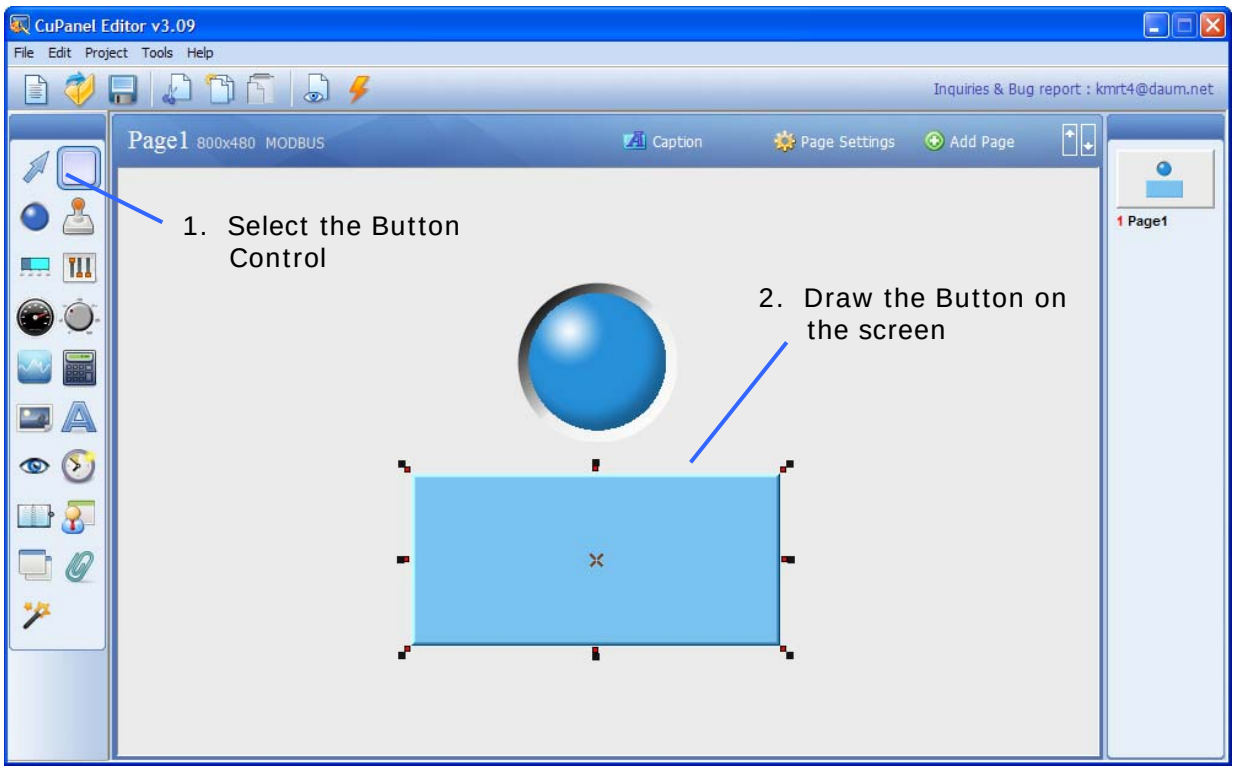
With the CUPANEL properly connected to a PC and the CUBLOC study board, a user interface project can be created with the CUPANEL Editor. Follow CUPANEL Editor installation instructions in the Software Installation chapter to download and install the CUPANEL Editor.



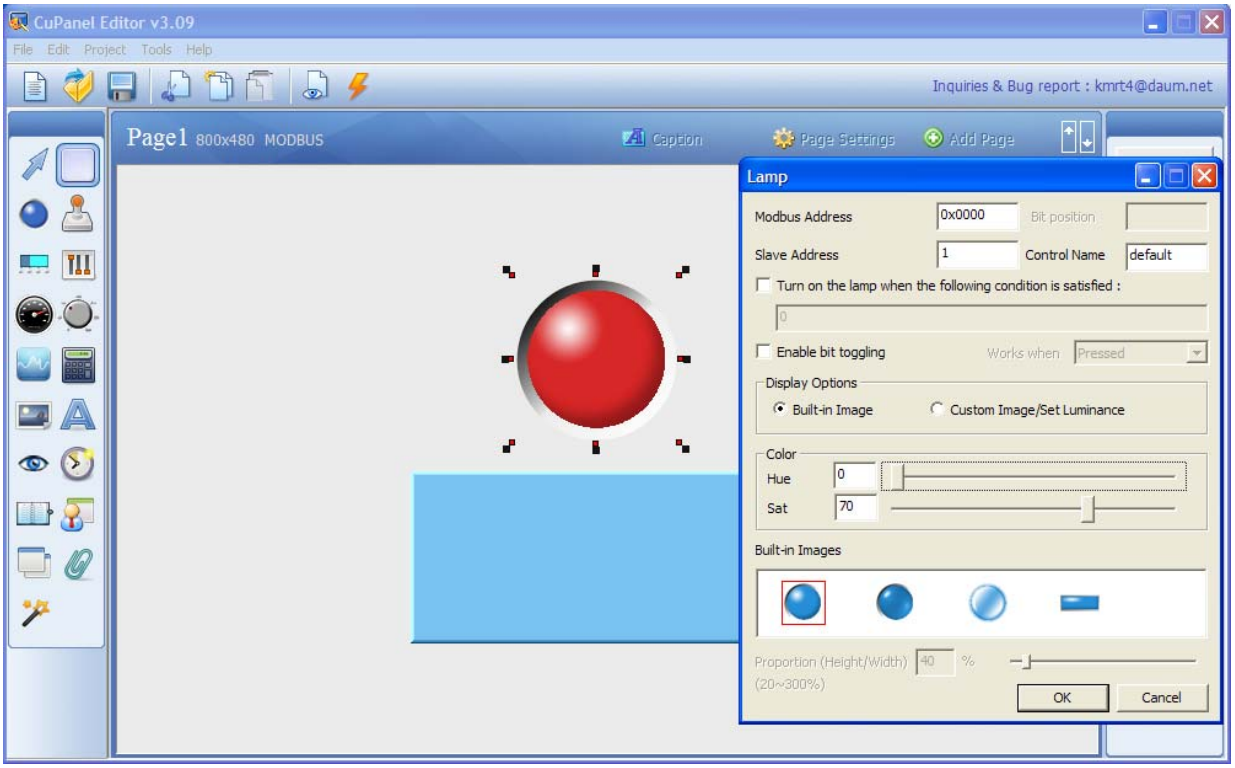
1. Once installed, run the CUPANEL Editor.



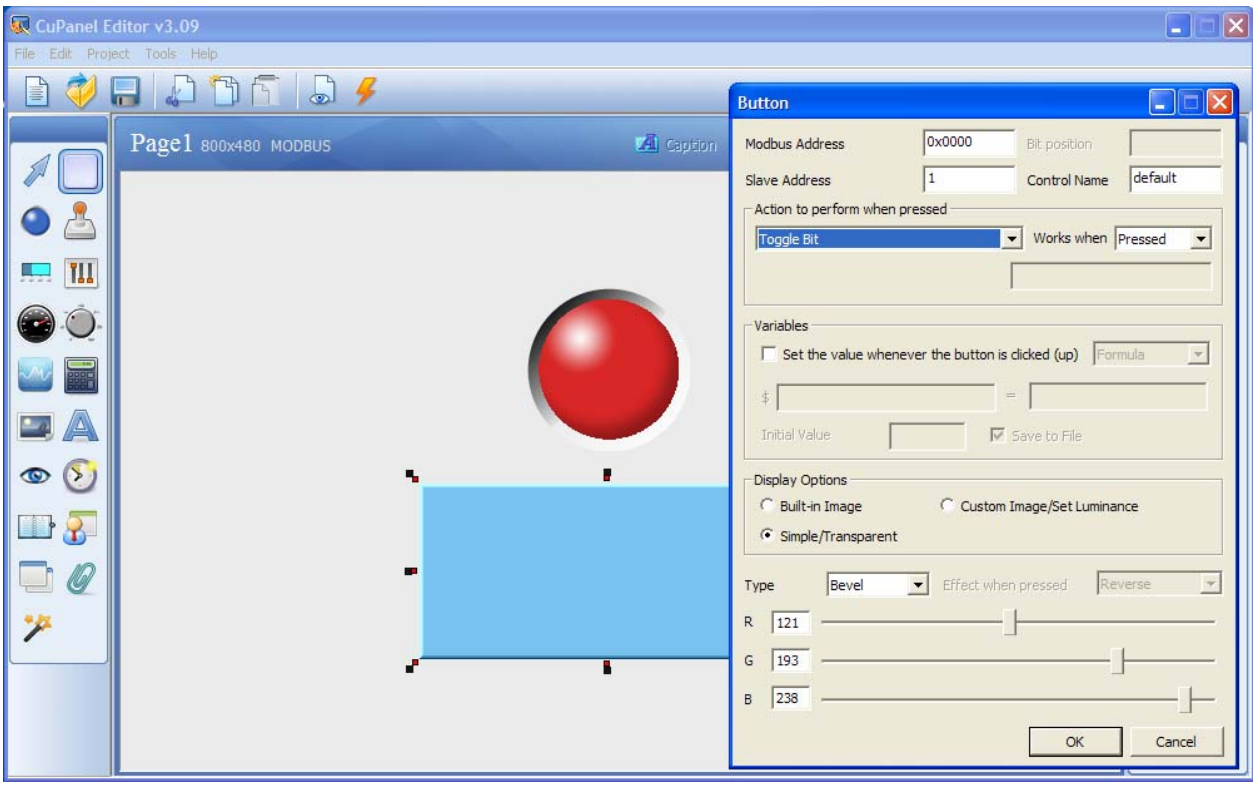
2. Select a Lamp Control (i.e. LED) from the toolbar and draw it on the center of screen.



3. Select a Button Control from the toolbar and draw it just below the lamp



4. Select the lamp, right-click it, and choose "Properties" to open the Lamp's properties window. Adjust the properties as shown in the screen above. Modbus Address 0x0000 is the address of the CUBLOC's P0 I/O port. The CUPANEL will read from this address and "light" this Lamp Control when P0 is ON. Adjust the Hue to 0 to make the LED red.

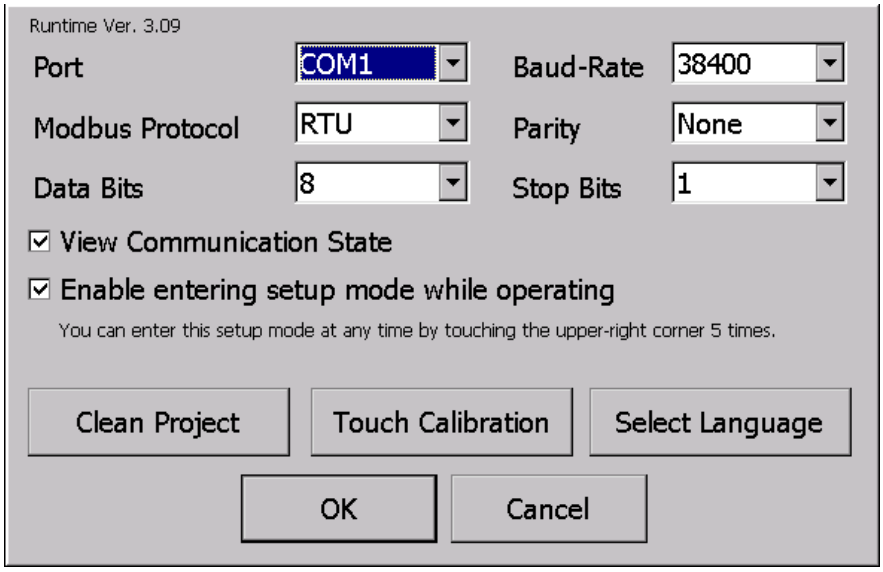


5. Select the Button, right-click it, and choose properties to open the button's properties window. Adjust the properties as shown in the screen above. Once again, Modbus Address 0x0000 is the address of the CUBLOC's P0 I/O port. Setting the "Action to perform when pressed" option to "Toggle Bit" will cause P0's state to toggle between on and off when the button is pressed.

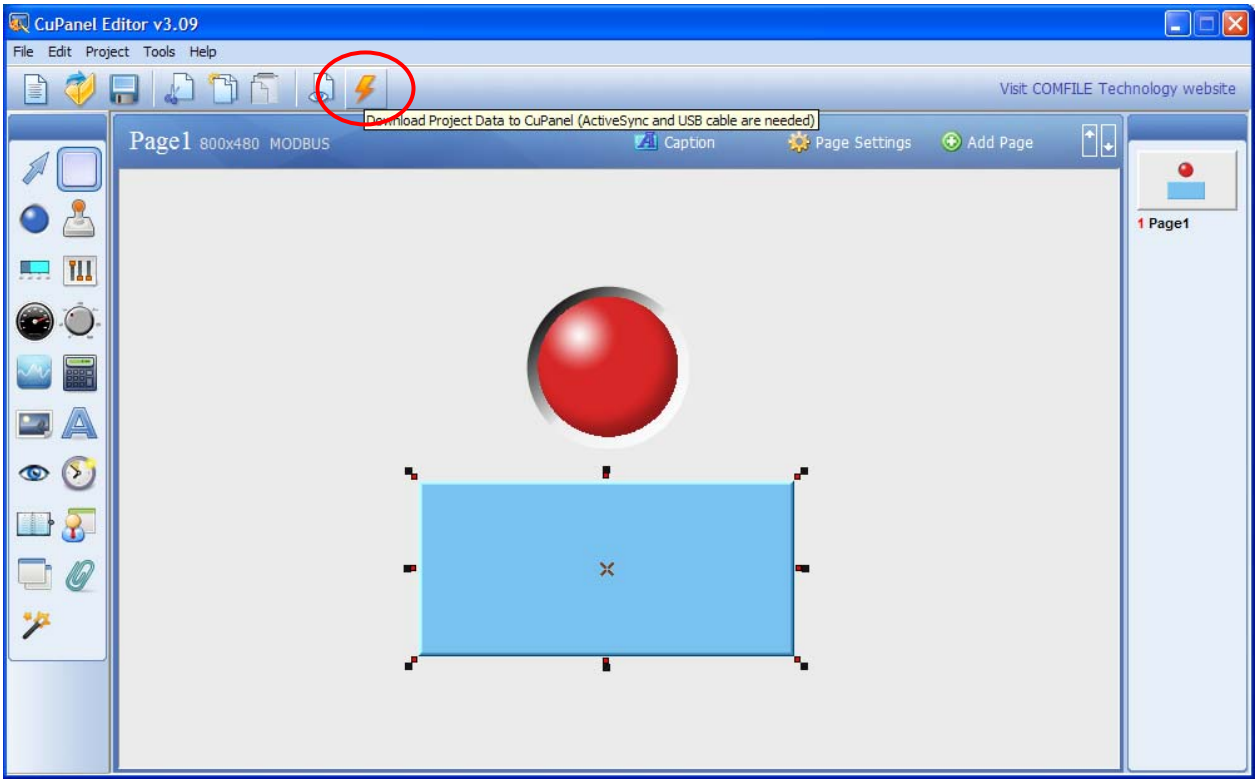
Downloading and Running the HMI User Interface on the Touch Controller

Now that the HMI user interface has been designed and configured with the CUPANEL Editor, it can be downloaded and executed on the CUPANEL touch controller.

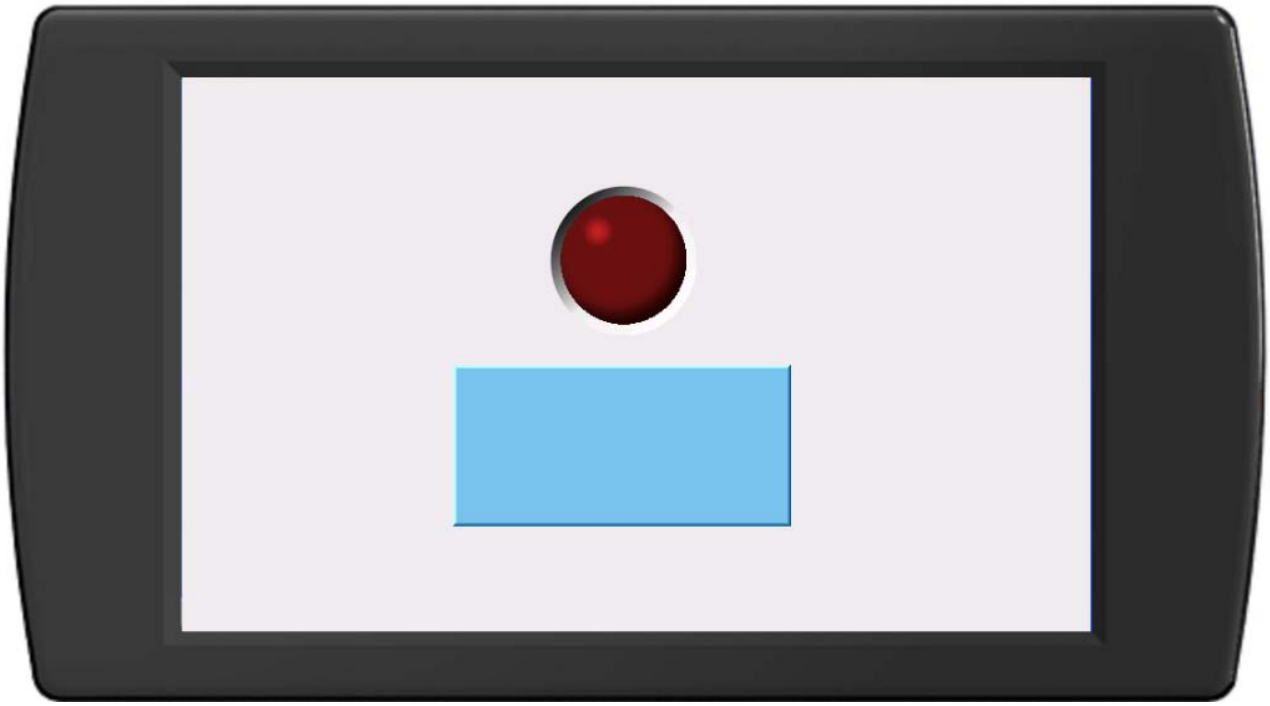
IMPORTANT: When a project is downloaded to the CUPANEL, it is downloaded to the touch controller's SD Card. Ensure an SD card is plugged into the touch controller before downloading.



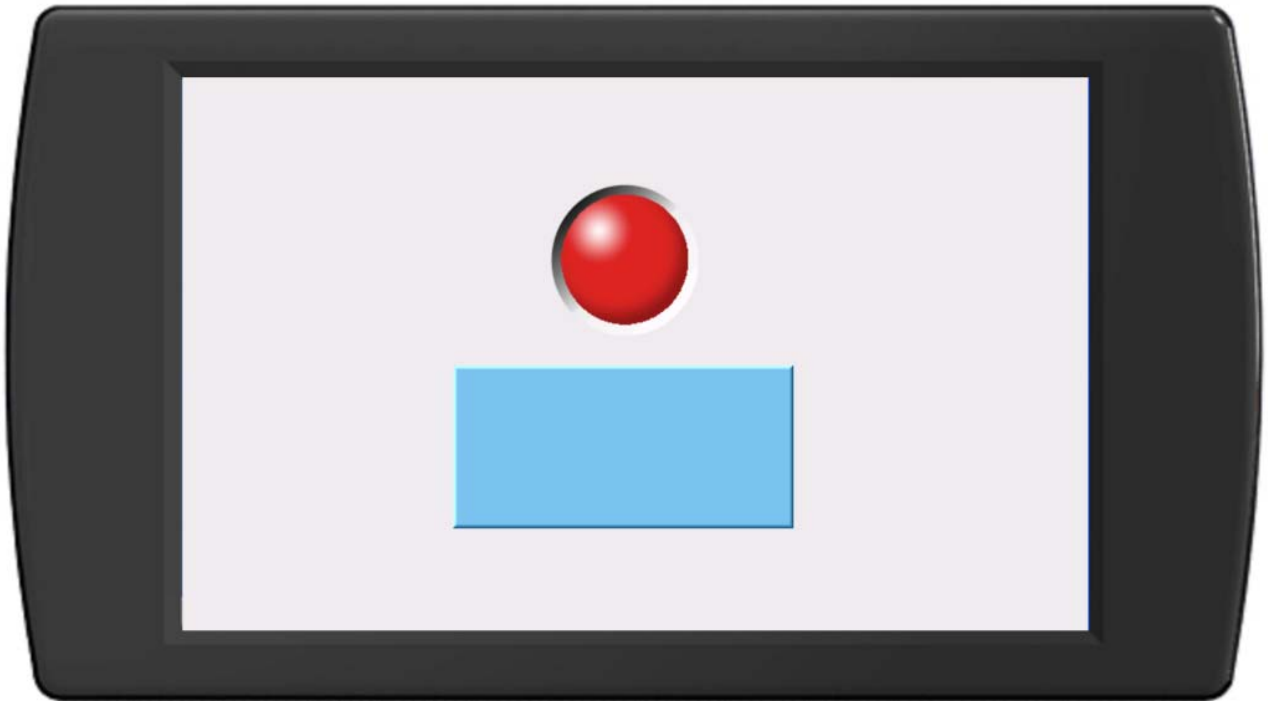
1. Adjust the RS-232 settings on the CUPANEL touch controller to match that of the CUBLOC.

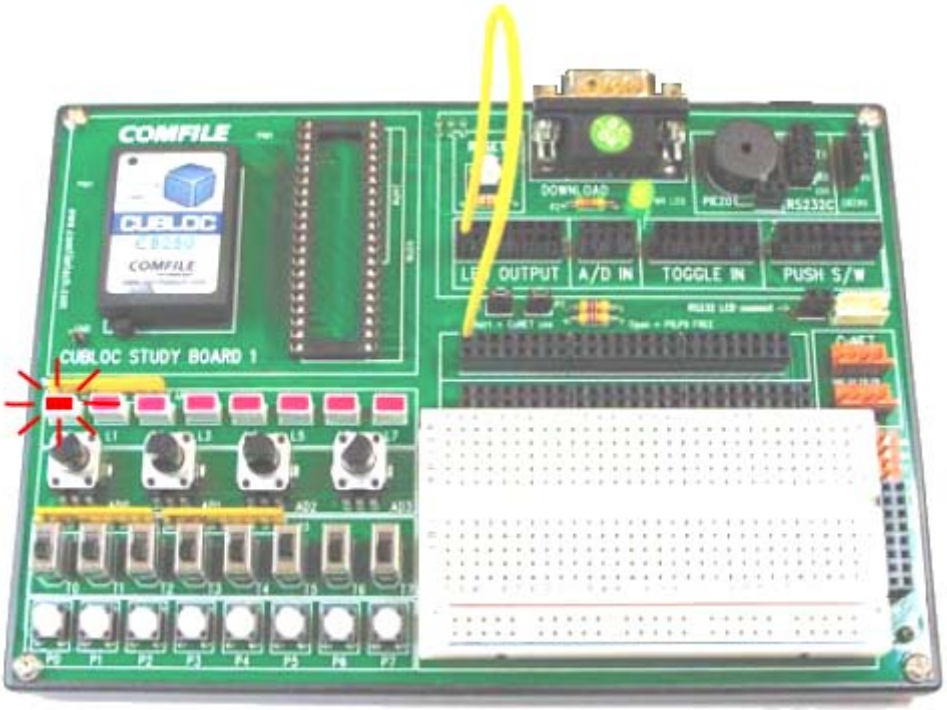


2. With the CUPANEL touch controller connected to the PC via USB, download the project to the touch controller by clicking the lightning bolt icon in the CUPANEL Editor's toolbar.



3. The user interface that was drawn in the CUPANEL Editor will then execute on the touch controller as a standalone program.



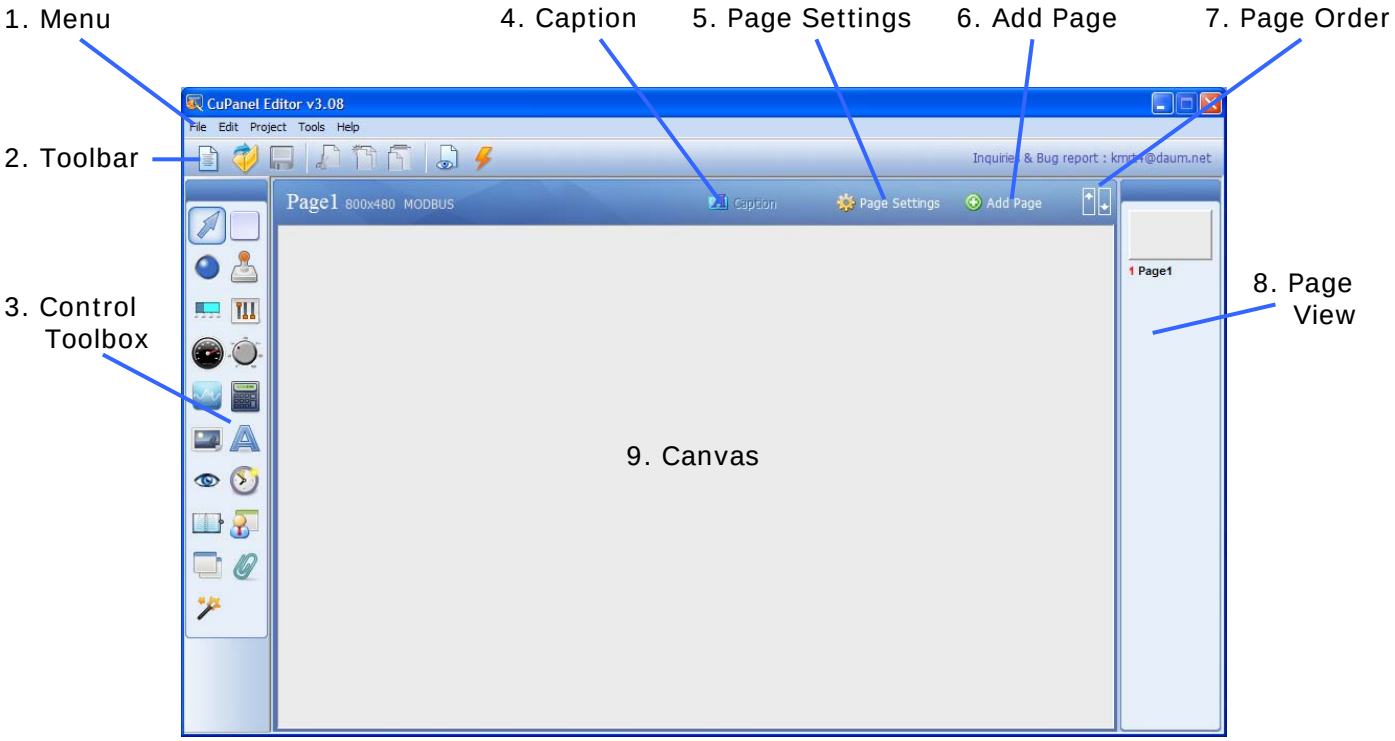


4. Touch the button on the CUPANEL touch controller. LED0 will light on the CUBLOC study board, and the Lamp Control will light on the CUPANEL touch controller.

Once the project data is downloaded to the touch controller, the PC is no longer required. The project will run as a standalone program and will be started each time the touch controller is powered on.

Chapter 3
The CUPANEL Editor

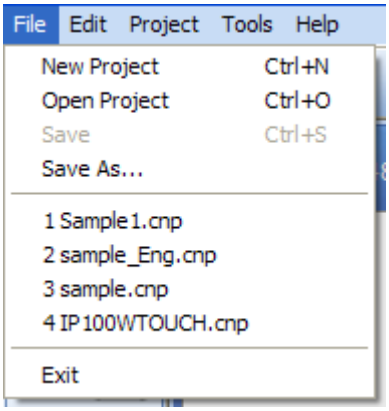
The Main Window



1. Menu – Main menu for conveniently accessing the CUPANEL Editor's features and settings.
2. Toolbar – A set of icons exposing the CUPANEL Editor's most frequently used features.
3. Control Toolbox – The list of controls (i.e. widgets) that can be drawn on the canvas.
4. Caption – Adds a textual caption to the currently selected control.
5. Page Settings – Opens the properties for the currently selected page.
6. Add Page – Adds a new page to the user interface. New pages will appear at the bottom of the page view.
7. Page Order – Changes the order of pages in the Page View by moving the currently selected page up or down in the list.
8. Page View – Shows a list of all the pages in the user interface. Click a page to select it and double-click it to display it on the canvas. Right-Click a page for even more options.
9. Canvas – The selected page's "screen" on which controls can be "drawn".

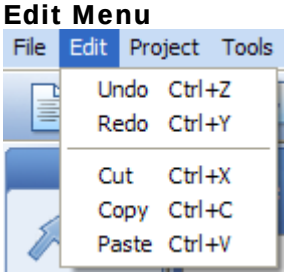
Menus

File Menu



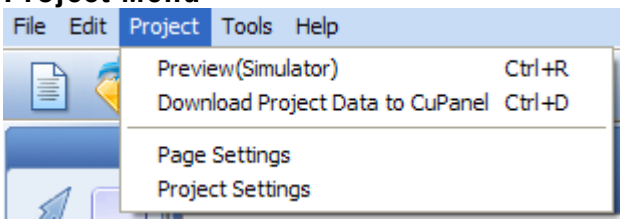
New Project	Creates a new CUPANEL project with an empty canvas.
Open Project	Opens an existing project from an existing CUPANEL project file (*.cnp)
Save	Saves the current project. If the project has never been saved, it will prompt for a file name.
Save As…	Saves the current project under a new file name.
1 – 4	4 most recently opened project files
Exit	Closes the CUPANEL Editor

Edit Menu



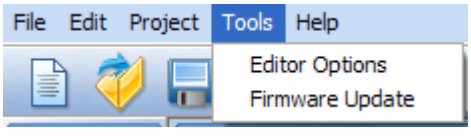
Undo	Undoes the last edit operation
Redo	Redoes and last edit operating that was undone.
Cut	Removes the currently selected items(s) and saves them to the clipboard.
Copy	Saves the currently selected items(s) to the clipboard without removing them.
Paste	Pastes a copy of the latest item(s) saved to the clipboard

Project Menu



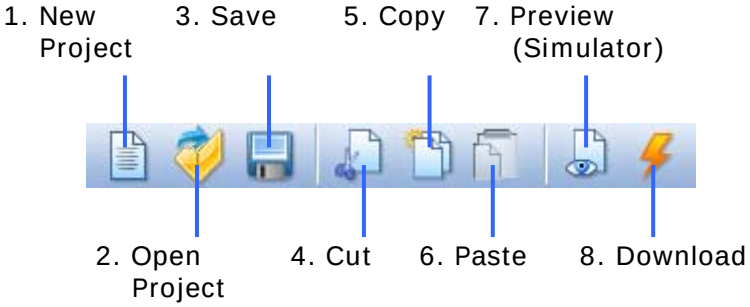
Preview (Simulator)	Runs the current project on the PC as if it were running on the CUPANEL touch controller.
Download Project Data to CuPanel	Downloads the project to the CUPANEL touch controller.
Page Settings	Opens the current page's settings for editing.
Project Settings	Opens the current project's settings for editing.

Tools Menu



Editor Options	Opens the CUPANEL Editor's settings for editing.
Firmware Update	Updates the CUPANEL touch controller's firmware.

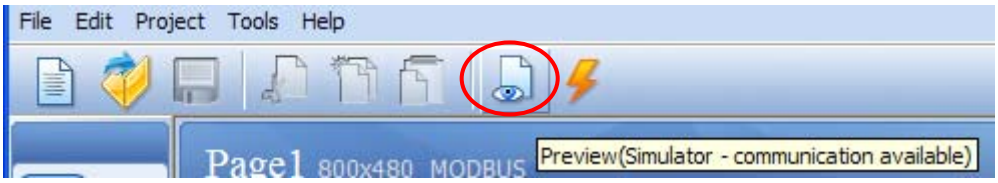
The Toolbar



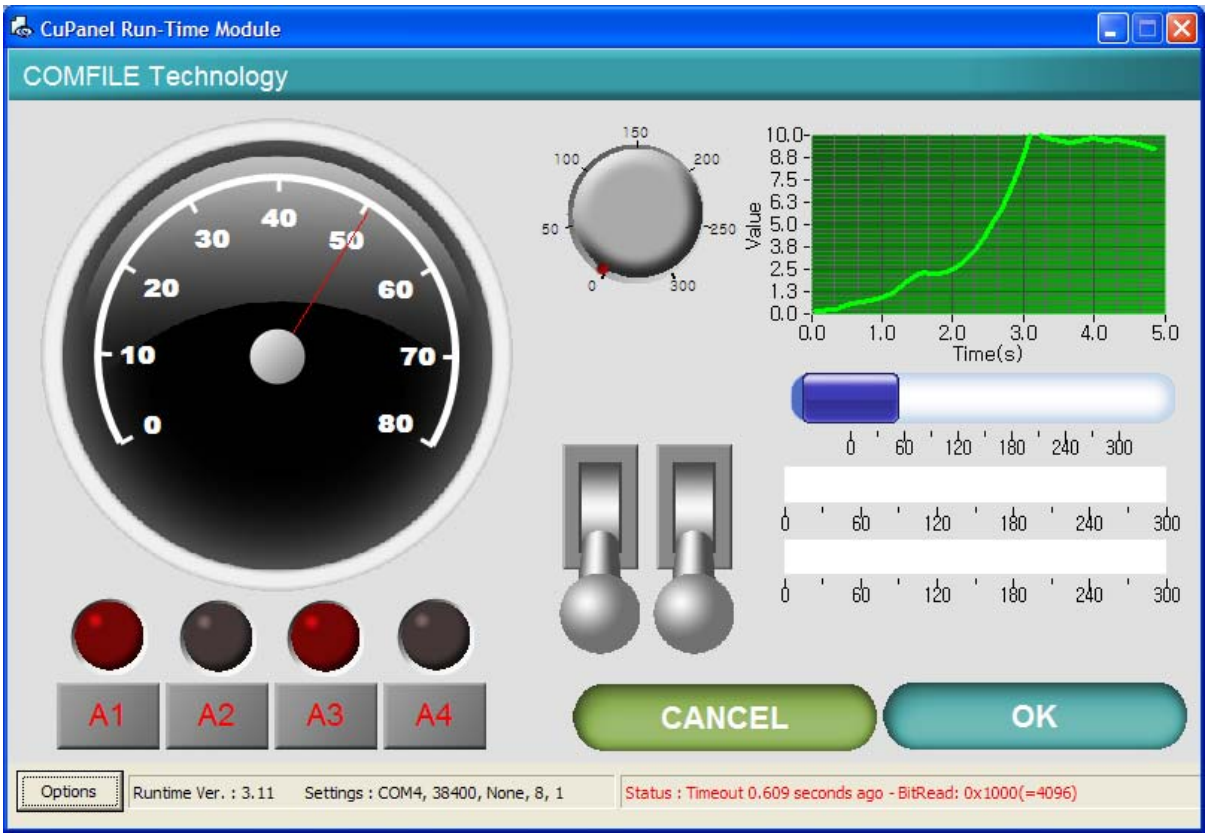
1. New Project – Creates a new CUPANEL project with and empty canvas.
2. Open Project – Opens an existing project from an existing CUPANEL project file (*.cnp)
3. Save – Saves the current project. If the project has never been saved, it will prompt for a file name.
4. Cut – Removes the currently selected item(s) and saves them on the system's clipboard.
5. Copy – Saves the currently selected items(s) to the clipboard without removing them.
6. Paste – Pastes a copy of the latest item(s) saved to the clipboard.
7. Preview (Simulator) – Runs the current project on the PC as if it were running on the CUPANEL touch controller.
8. Download - Downloads the project to the CUPANEL touch controller.

The Simulator

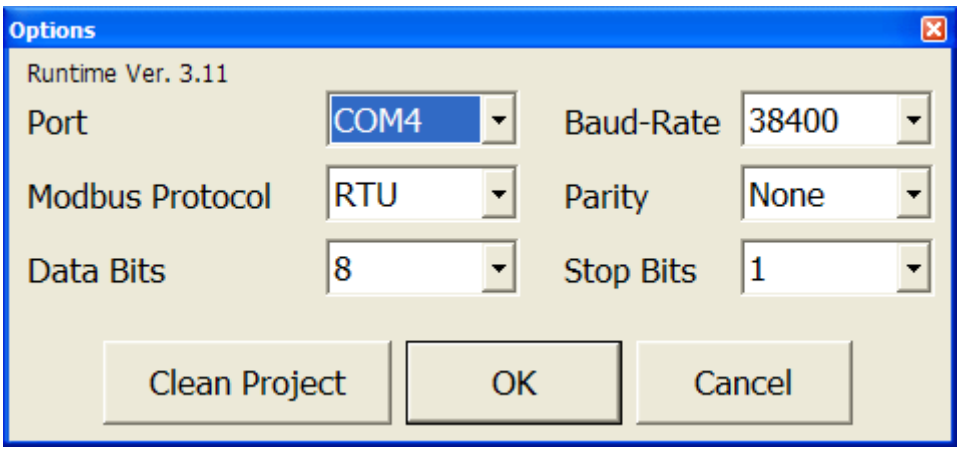
When developing a user interface, it is often necessary to test its functionality and make changes in a cyclical fashion. This change → test → change cycle would incur a lot of time if each time a test was performed the project had to be downloaded to the touch controller. The Simulator was developed to make this procedure far more efficient.



1. When testing a user interface, it is not necessary to download it to the touch controller. Rather, click the Preview icon in the Toolbar to start the Simulator.



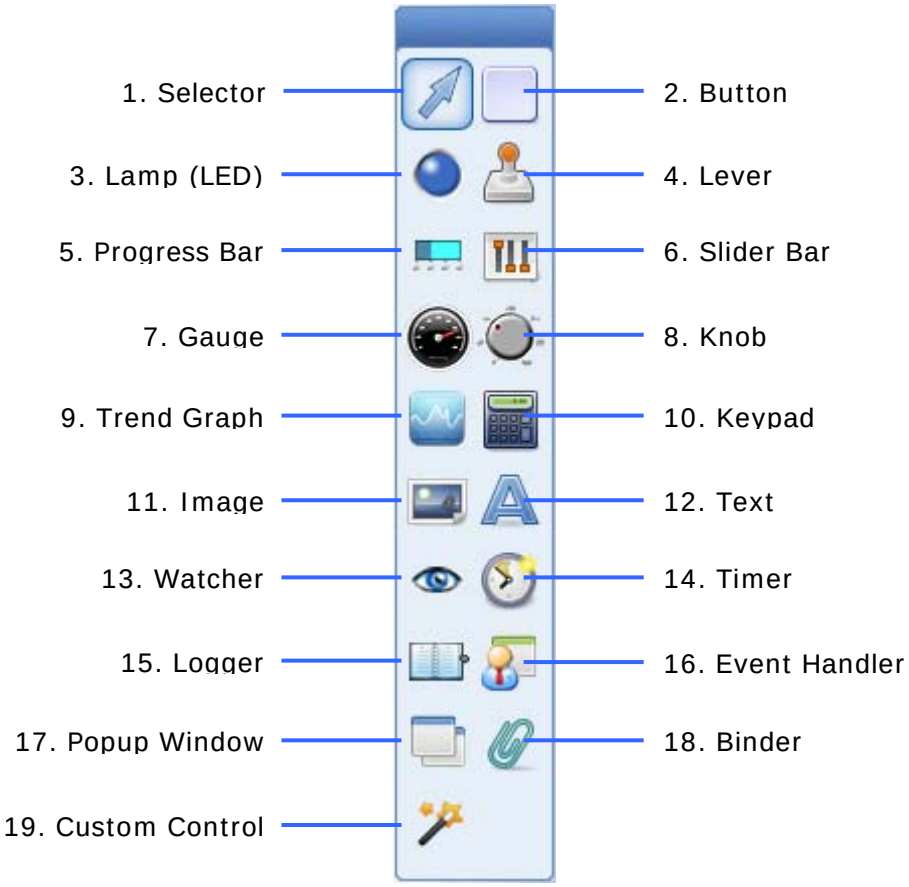
2. A new window will open with the user interface fully interactive (Buttons can be clicked, knobs can be turned, lamps light, etc…). It behaves identically to how it would behave if it were downloaded to the touch controller.



3. Using the PC's serial ports, the Simulator can also communicate with a PLC or other electronic device. Click the "Options" button to open the RS-232 settings dialog.

Controls

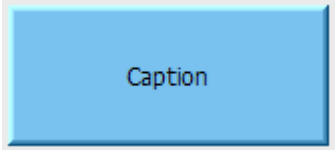
The Controls are the widgets that can be drawn on a page to provide the user interface's functionality. Once drawn on the screen they can be moved, resized, and configured through a feature-rich set of options. The controls can be selected from the Control Toolbox on the left side of the CUPANEL Editor.



1. Selector

The Selector is not actually a control. It is just a tool used to select controls already on the canvas. To use, select the Selector from the Control Toolbox and then click and drag over any control(s) already drawn on the canvas. All of the controls within the Selector's rectangle will be selected.

2. Button



The Button Control is similar to buttons found in most other graphical user interfaces. It performs an action when pressed.

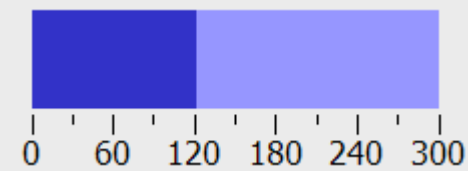
3. Lamp (LED)

The Lamp Control is analogous to a lamp or LED(Light Emitting Diode) indicator that one might see on a machine or an appliance. Is shows lit when on, and unlit when off.

4. The Lever

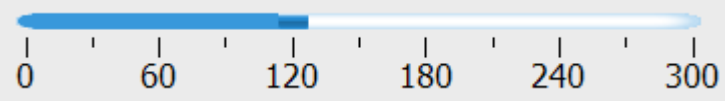
The Lever Control is analogous to a typical toggle switch with an "on" and "off " state.

5. Progress Bar



The Progress Bar Control is similar to progress bars found in other graphical user interfaces. It displays a progress meter showing how much of a task is completed and how much of a task remains. It can be oriented horizontally or vertically.

6. Slider Bar

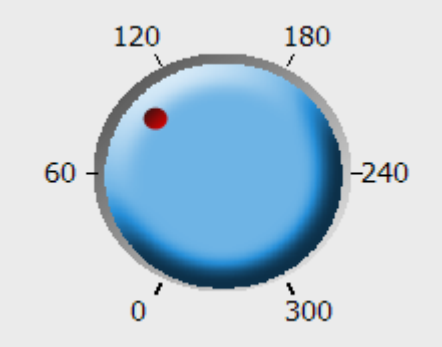


The Slider Bar Control allows the user to adjust a value within a finite range. It can be oriented horizontally or vertically.

7. Gauge

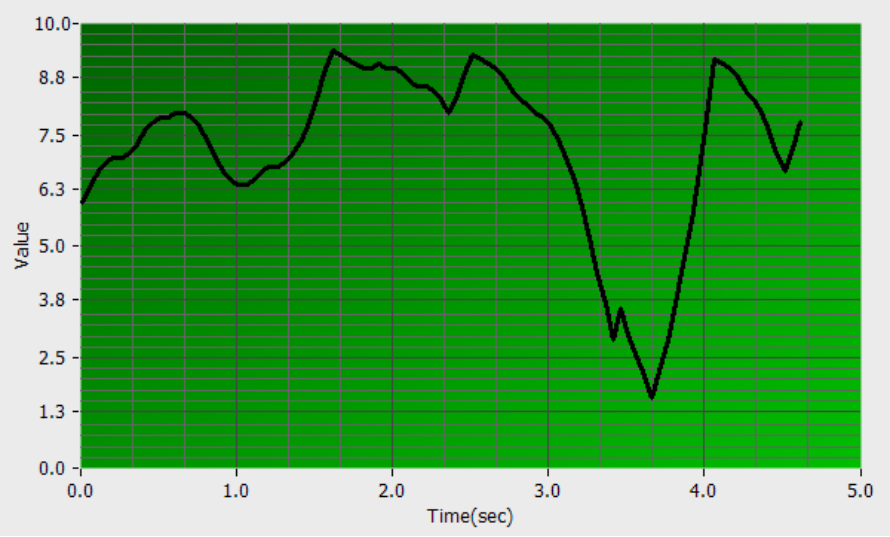
The Gauge control is analogous to the gauges commonly found on instrument panels everywhere. It is an output-only control with a rich set of aesthetic customizations.

8. Knob



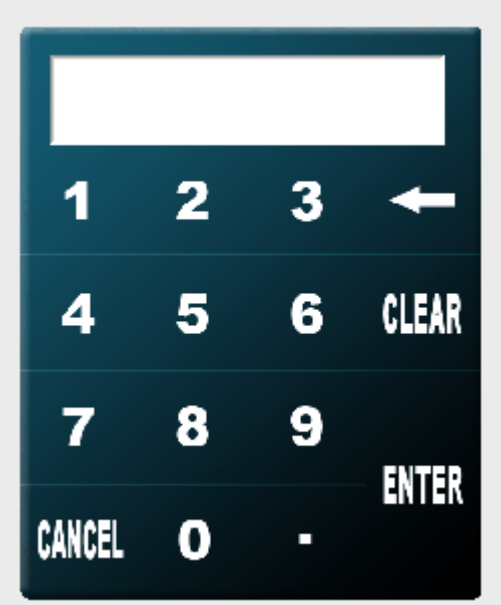
The Knob Control is analogous to knobs typically found on control panels and appliances. Like the Slider Bar Control it is allows the user to adjust a value within a finite range.

9. Trend Graph



The Trend Graph Control is analogous to the screen on an oscilloscope. It is an output control that displays a value, read over time, on an x-y coordinate plane. It has a rich set of features including multiple channels, colors, and scale adjustments

10. Keypad

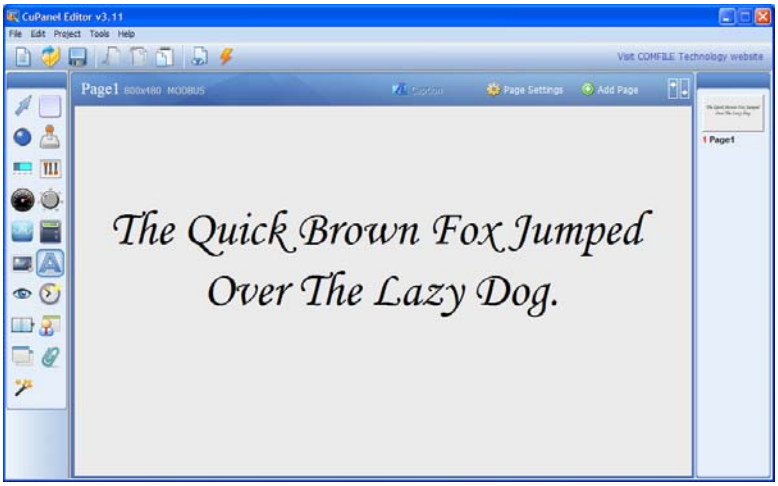


The Keypad Control is used to accept arbitrary numeric input from the user.

11. Image

The Image Control is a purely aesthetic control. It is used to add logos, backgrounds, photographs or any other graphic to the canvas to visually enhance the user interface.

12. Text



The Text Control is used to add messages, labels, or any other text to the user interface. It has a rich set of customizations that include font, size, color, and alignment.

13. Watcher

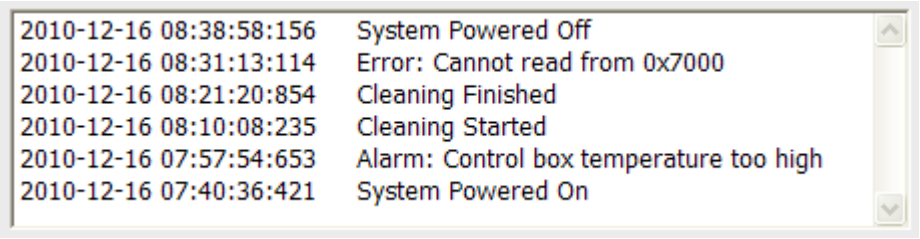
The Watcher Control is used to continuously read from a PLC or other electronic device, monitoring the device's state, and updating the user interface accordingly. It accomplishes this by setting variables based on values read from the PLC. It is functional only, and is therefore not displayed on the user interface at runtime.

14. Timer

The Timer Control is used to create periodic events (e.g. an event every *n* seconds). Using the Event Handler Control, actions can be attached to these events so they are performed whenever the Timer ticks (i.e. Timer's interval elapses). A common scenario is writing to a PLC every *n* seconds; the Timer would be used to define the time interval, *n*, and the Event Handler would be used to define the action

of writing to the PLC when the time interval elapses. The Timer Control is functional only, and is therefore not displayed on the user interface at runtime

15. Logger


2010-12-16 08:38:58:156 System Powered Off
2010-12-16 08:31:13:114 Error: Cannot read from 0x7000
2010-12-16 08:21:20:854 Cleaning Finished
2010-12-16 08:10:08:235 Cleaning Started
2010-12-16 07:57:54:653 Alarm: Control box temperature too high
2010-12-16 07:40:36:421 System Powered On

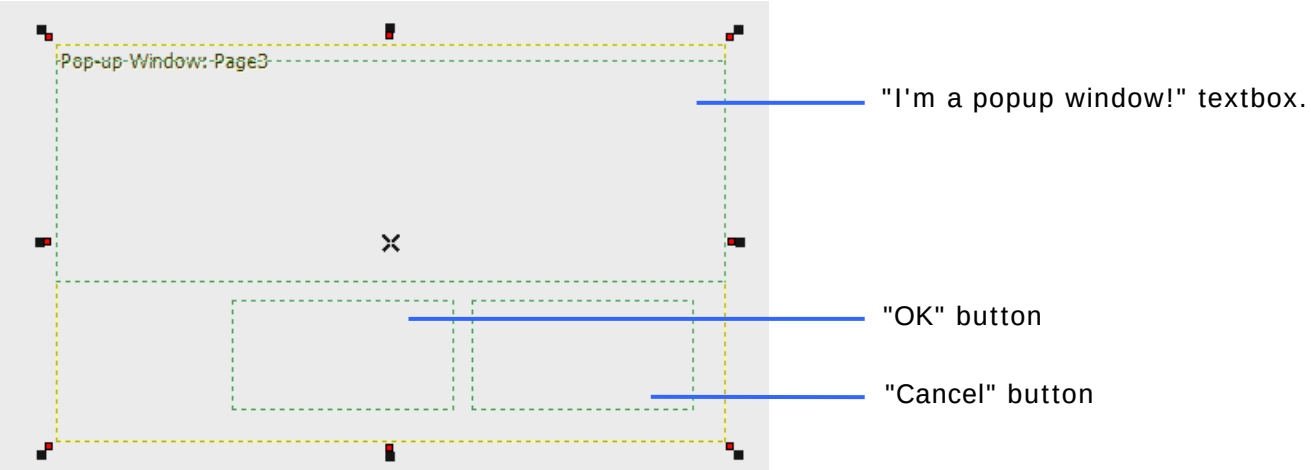
The Logger Control keeps a running log of notable events that may occur while a system is running. Use with the Event Handler Control to specify when and what to log.

16. Event Handler

The Event Handler Control is a powerful control used to define actions to perform when a certain event occurs. Actions can be setting values, writing to a PLC, navigating to a new page, etc… just to name a few. Events can be a Timer tick, a Page load, a button click, etc… An action defines *what* should be performed, and an event defines *when* and/or *on what condition* the action should be performed. The Event Handler Control is functional only, and is therefore not displayed on the user interface at runtime.

17. Popup Window

The Popup Window Control is used to define a popup window to display under a certain condition. The condition is configured in the Popup Window Control's properties, but the actual content of the popup window is created as a Page. Drawing a Popup Window Control on the canvas defines size of the popup window and location where the popup window will display.



When drawing a Popup Window Control on the canvas, the controls in the in the Page to be displayed will show as green dotted lines. It may be necessary to reposition the controls on the Page to ensure they fit within the popup window.

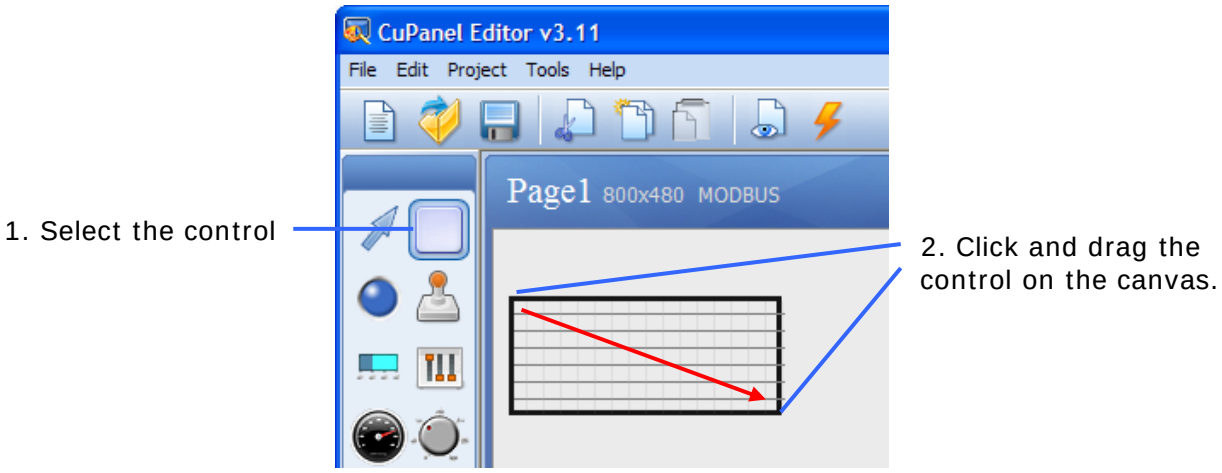
18. Binder

The Binder Control was created strictly for performance and efficiency reasons. It performs I/O read operations on behalf of multiple controls thereby reducing redundancy and improving I/O performance. It is functional only, and is therefore not displayed on the user interface at runtime

19. Custom Control

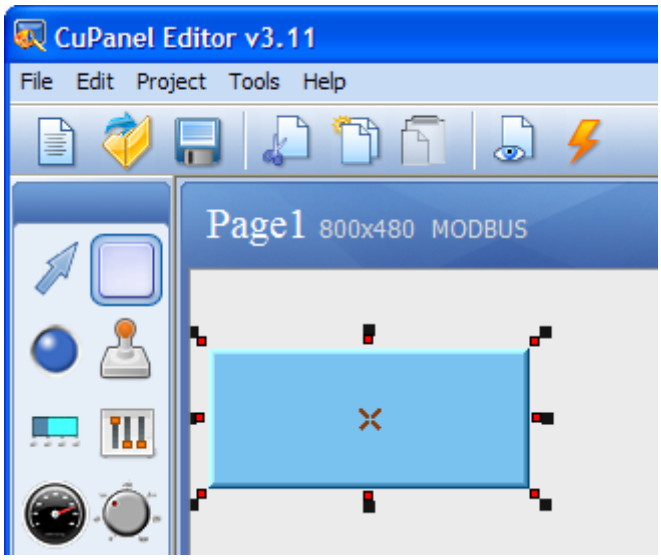
The Custom Control was created to provide a way to extend the CUPANEL Editor with custom functionality. If you are interested in this feature, please contact Comfile Technology.

Drawing A Control


1. Select the control
CuPanel Editor v3.11
File Edit Project Tools Help
Page1 800x480 MODBUS
2. Click and drag the control on the canvas.

To "draw" a control on the canvas:

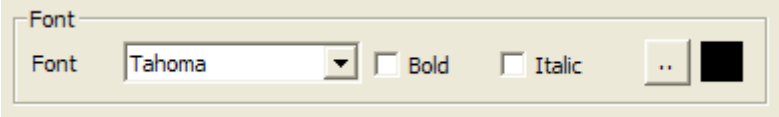
1. Select the control from the Control Toolbox
2. Click and drag the control on the canvas to the desired position and size.



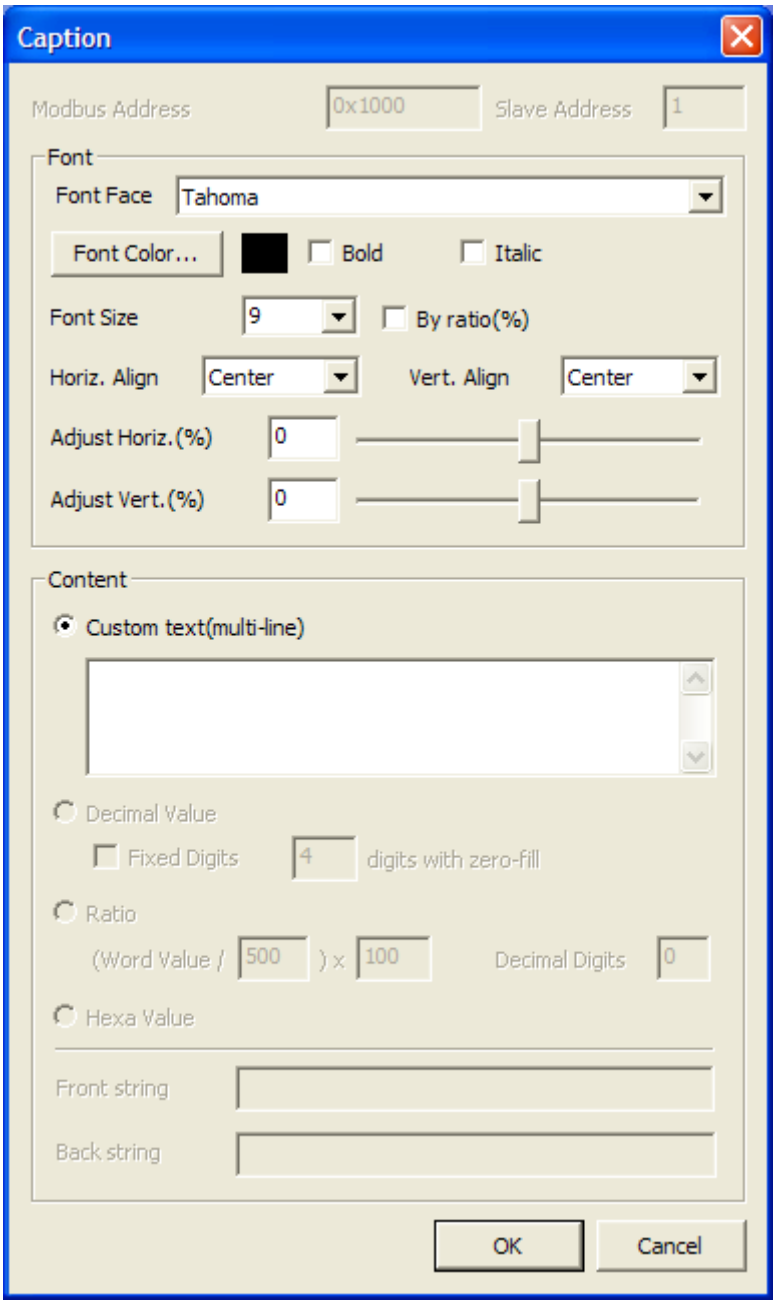
3. Release the mouse button and the control will appear as drawn.

Customizing a Control's Appearance

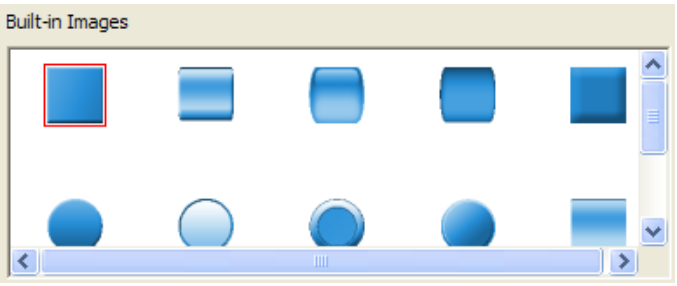
The CUPANEL Editor has a rich set of features for customizing controls' appearance. These include fonts, shapes, colors, gradients, and even custom images. Each control is unique in its appearance and features, so each control's properties are different.

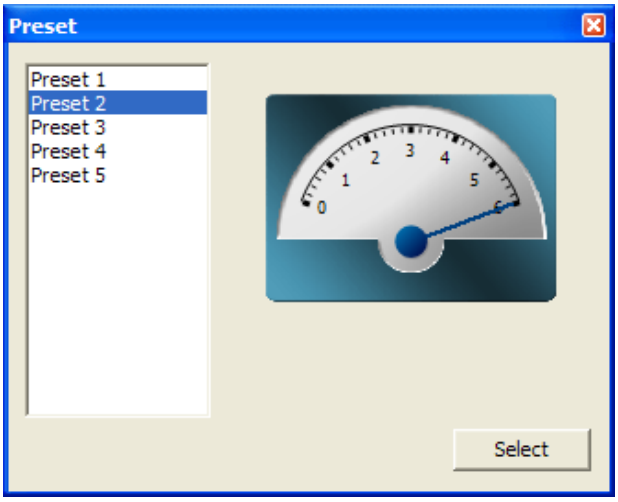


Controls that feature text of any kind will typically have properties for font, style, and color.

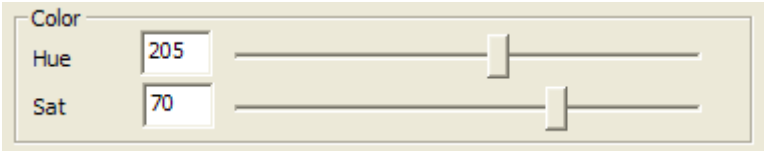


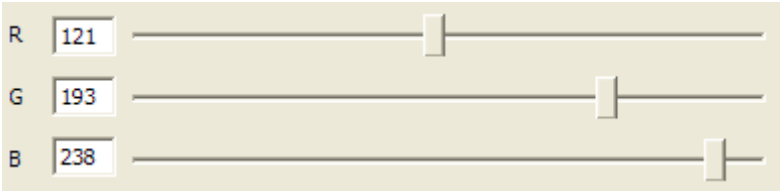
In addition a caption can be added to any control. Captions feature a richer set of customizations that include font, style, color, size, alignment, positioning, and more. For multiline text, type a carriage return. The text can be static text that never changes, or dynamic text that changes based on variables' values. See the Variables section for more information.



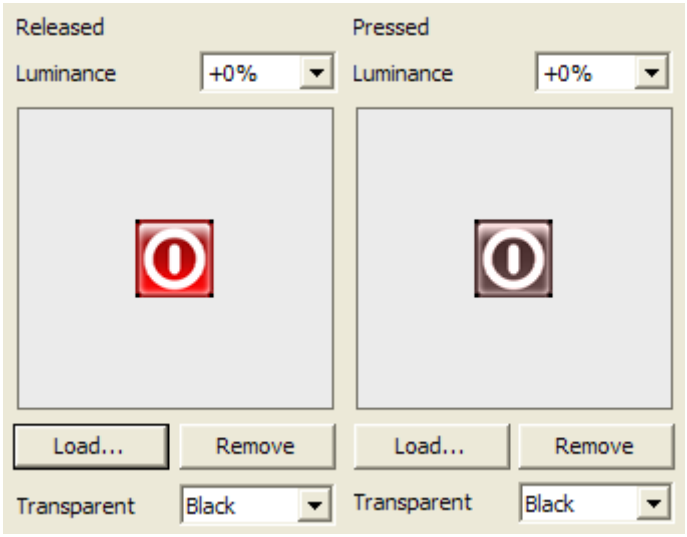


Some controls feature built-in images or presets that provide the ability to choose from a list of styles, shapes, and color gradients.

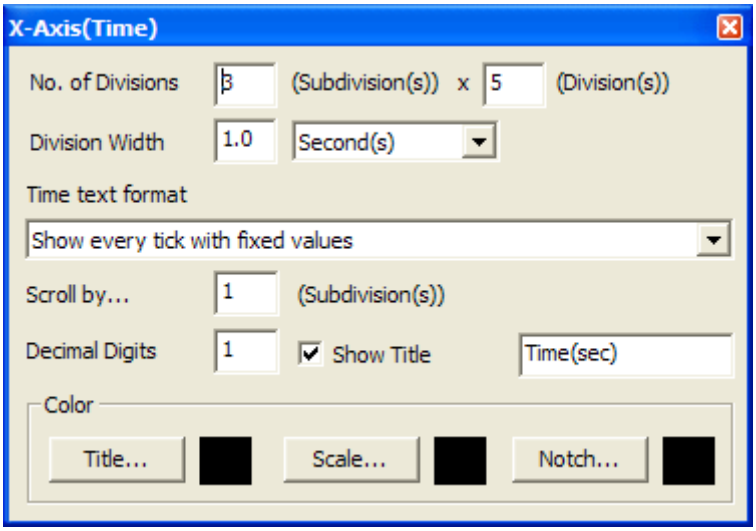




Controls that feature graphics of some kind will typically feature some color adjustment features such as hue and saturation those controls that feature built-in images (raster graphics) or the standard red(R)-green(G)-blue(B) values for those controls that are drawn as shapes (vector graphics).



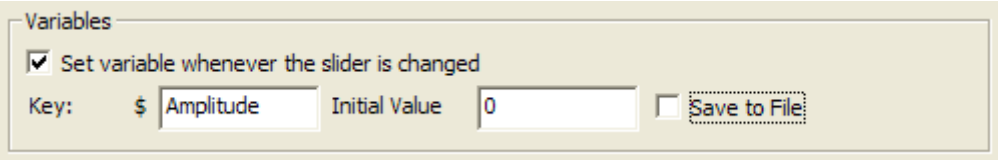
For those user interfaces that require complete customization, custom images can be assigned to the controls. The image above shows a button being customized to display a power symbol, and to show differently when it's pressed or released. The images can be further customized by adjusting their luminance/brightness, and can even treat black or white pixels as transparent.



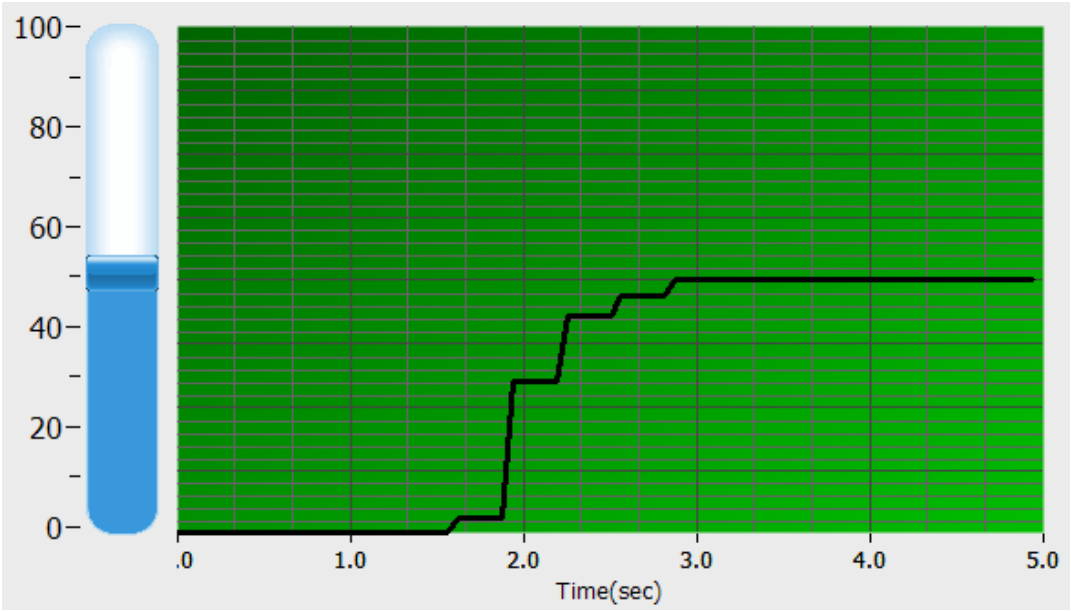
Finally there are controls like the Knob, Slider, Gauge and Trend Graph that show scales. These scales can be customized to specify the number of divisions, subdivisions, range of values, and even where or how the scale is drawn.

Variables

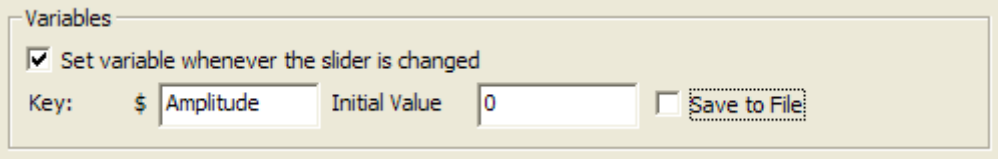
One of the most fundamental concepts in using the CUPANEL Editor is making use of variables. A variable is just a named value that can be referred to by any control or page. A variable can be read from in order to use the variable's value for some purpose, or written to in order to change or update the variable's value.



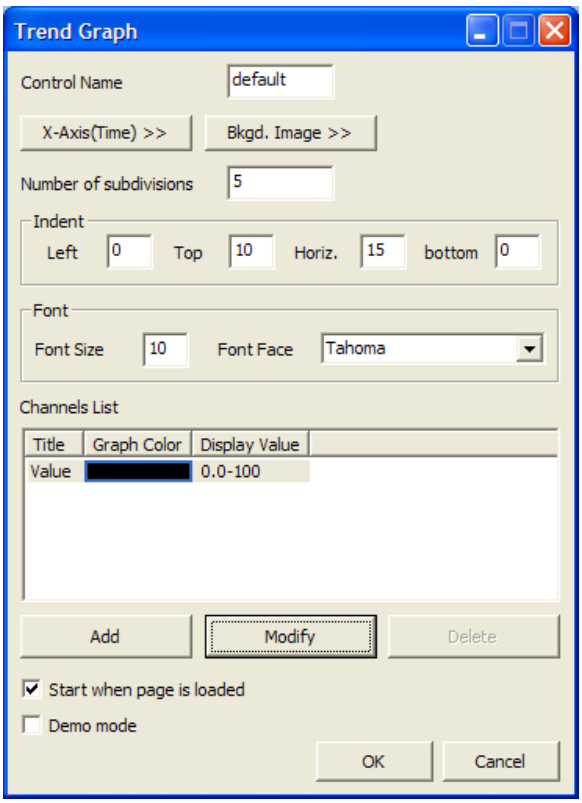
A variable can be defined in the properties of any control that can read from or write to a variable as shown in the image above. The "$" textbox is the variable's name; in this case "Amplitude". The "Initial Value" is the variable's starting value. The "Save to File" option is used to store the value to a file any time it is changed so it can be restored should the program be closed and restarted again. Once a variable is defined, it can be used anywhere in the user interface.



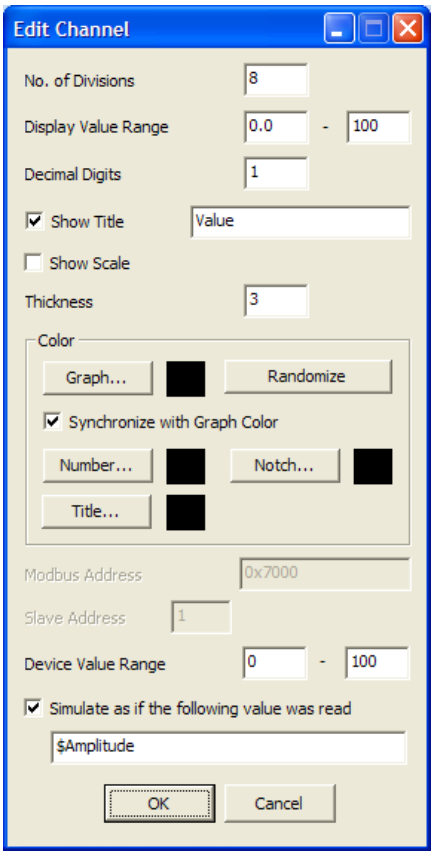
For example, suppose we wanted to adjust a variable's value with a Slider, and display the value on a Trend Graph.



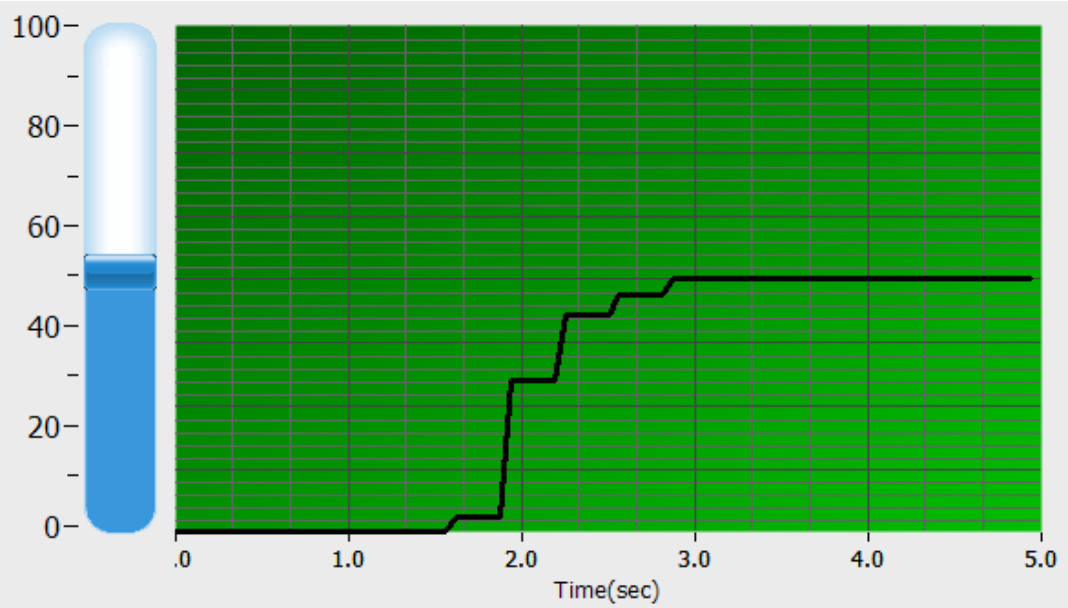
1. Right-Click the Slider Control to open its properties. Give the variable a name of "Amplitude" and an initial value of "0". Now, when the Slider is adjusted, the Slider's value will be written to the variable "Amplitude".



2. To have the Trend Graph read from the variable "Amplitude", right-click the Trend Graph, select the channel in the "Channels List", and click the "Modify" button to change its settings.



3. Check the "Compute value from formula" checkbox and type the name of the variable in the textbox prefixed with a "$". The "$" prefix distinguishes variables from other text. Now the Trend Graph will always display the value of the variable "Amplitude".



Execute the project. When the Slider's value is adjusted, the Trend Graph will reflect that adjustment.

System Variables

The CUPANEL runtime predefines the following system variables.

Name	Value
$sys_year	The current year
$sys_month	The current month
$sys_day	The current day
$sys_hour	The current hour (0 – 23)
$sys_minute	The current minute
$sys_second	The current second
$sys_tick_count	The number of milliseconds since the system booted
$sys_untreated_packet_count	The number of packets waiting to be sent

Formulas

Sometimes it is necessary to perform mathematical operations, make logical decisions, and format data in a user interface. The CUPANEL Editor supports a rich set of mathematical, bitwise, logical, and formatting operators and features specifically to support this need.

Mathematical Operators

+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulus
0x	Hexadecimal prefix – 0x0A is a decimal 10.

Bitwise Operators

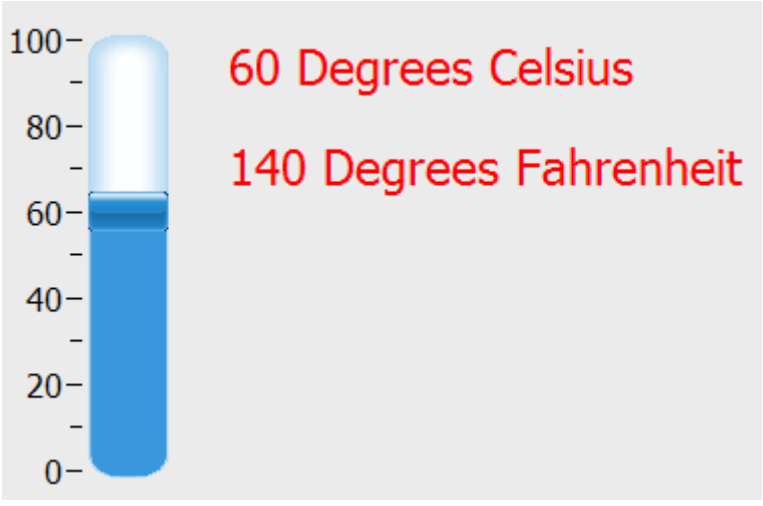
&	Boolean AND
|	Boolean OR

Logical Operators

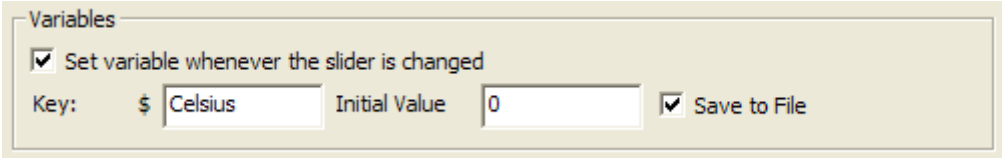
&&	Logical AND
||	Logical OR
<	Less than
<=	Less than or equal
>	Greater than
>=	Greater than or equal
==	Equal
!=	Not Equal

Formatting

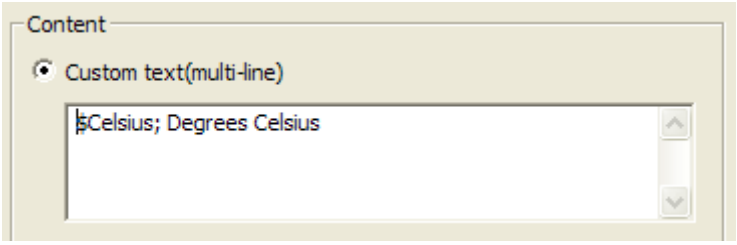
;	Tells the formula parser to print value of variable – If variable $a stores the value 10, typing "$a" in a text field will print "$a", but typing "$a;" will print "10".
(*d.f*)	Decimal Formatting – If variable $a stores the value 9.4, "$a(2.3);" will print "09.400". *d* is the number of digits to print before the decimal point, and *f* is the number of digits to print after the decimal point.
(*n*h)	Hexadecimal Formatting (lower case) – If variable $a stores the value 10, "$a(3h);" will print "00a". *n* is the number of digits to print.
(*n*H)	Hexadecimal Formatting (upper case) – If variable $a stores the value 10, "$a(3H);" will print "00A". *n* is the number of digits to print.
{}	Evaluation operator – In a text field, typing "1+2 equals {1+2};" will print "1+2 equals 3".



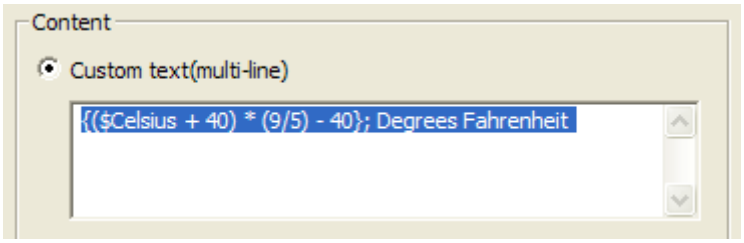
For example, suppose a user interface required temperatures to be displayed in both Degrees Celsius and Degrees Fahrenheit:



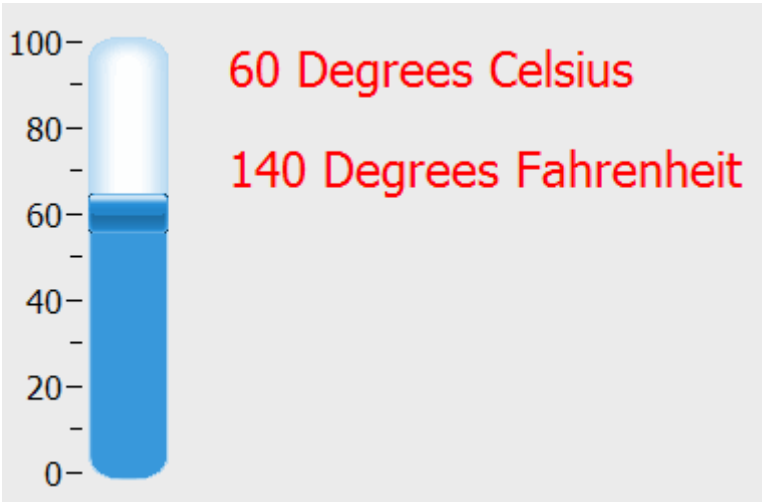
1. Add a Slider to the canvas, right-click it, and have it set the variable $Celsius when changed.



2. Add a Text Control and set its content as shown above to display the Slider's value in Degrees Celsius. If the slider is adjusted to 60, this text will display "60 Degrees Celsius".



3. Add a second Text Control and set its content as shown above with the formula "{($Celsius + 40) * (9/5) - 40}; Degrees Fahrenheit" to display the Slider's value in Degrees Fahrenheit. If the slider is adjusted to 60, this text will display "140 Degrees Fahrenheit".

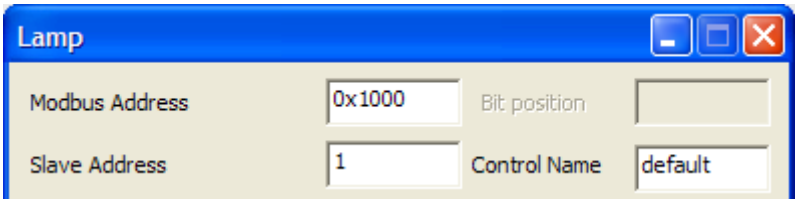


Execute the project. Now when the Slider's value is adjusted, the text boxes will update with the correct Celsius and Fahrenheit values

Modbus Communication

Most of the controls can be bound to a specific bit or word register on a PLC. When the register's value changes, any control bound to that register is updated to reflect the change.

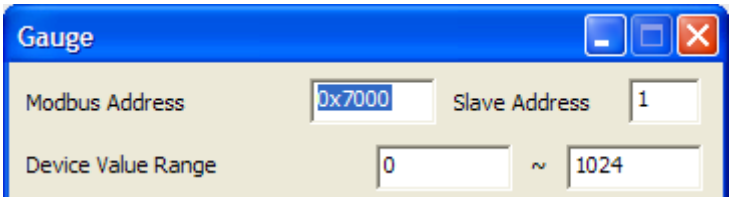
Bit Register Bound Controls



The Lamp Control is a simple example. It can be bound to a bit register on a PLC by configuring its Modbus properties. In the image above, the Lamp Control is bound to register 0x1000 on slave device 1. Whenever this register's value is ON, the lamp will show lit. If this register's value is OFF, the lamp will show unlit.

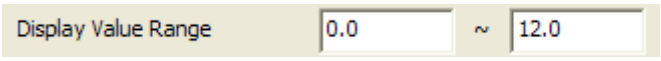
Word Register Bound Controls

Controls with the ability to show a range of values can be bound to word registers.



The Gauge is a good example of a control that can be bound to a word register. In the image above, the Gauge control is bound to word register 0x7000 on slave device 1. But in addition, the range of valid values read from the PLC can also be specified. In this example the Gauge expects to only receive values from 0 through 1024.

The values read from the PLC may not always be the values that one would want to display to the user. For example, the gauge might read values from 0 through 1024, but these numbers might represent voltages from 0 to 12.



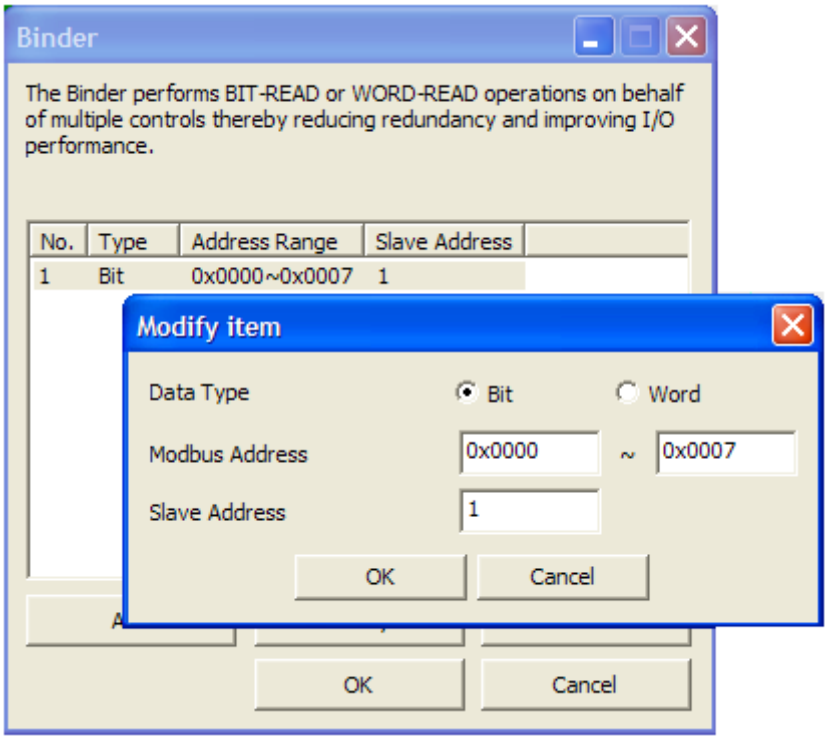
For this reason, word-bound controls can be scaled by specifying the "Display Value Range" property. In the image above, the values 0 through 1024 as read from the PLC will be scaled to 0.0 through 12.0 when displayed on the screen.

Two-Way Binding

Those controls that can receive input from the user (Button, Slider, Knob, etc…) can also be bound to PLC registers. In these cases, when the user adjusts the control, a value is written to the PLC. But this binding is two-way, so, if the register's value is updated by some other means besides the bound control, the bound control will read register's value and update accordingly.
When many controls are bound to the PLC, the communication channel can become congested.
For example, if there are 8 Lamp Controls bound to bit registers 0x0000 through 0x0007, 8 separate read operations will be issued.

Using the Binder Control to Reduce Congestion

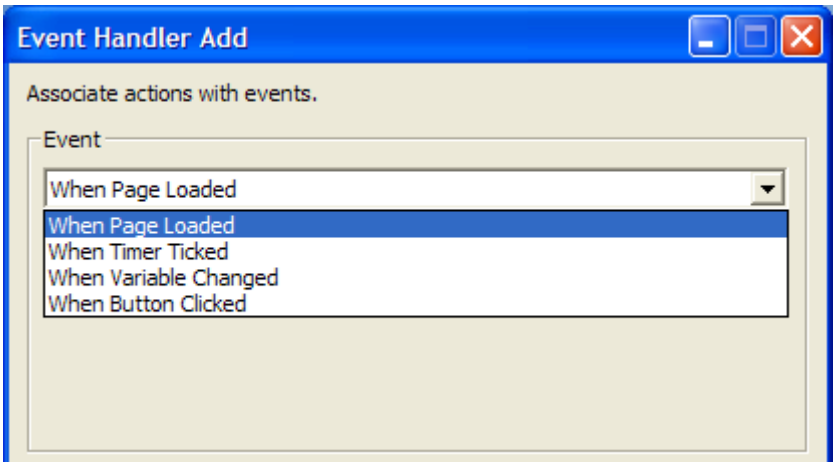
The Binder Control was created to alleviate some of this congestion. Using the Binder Control several registers can be read simultaneously in one read operation by specifying a range of registers to read.



In the example above, bit registers 0x0000 through 0x0007 will be read simultaneously in one read operation, alleviating the system of the 8 individual read operations that would occur without the binder.

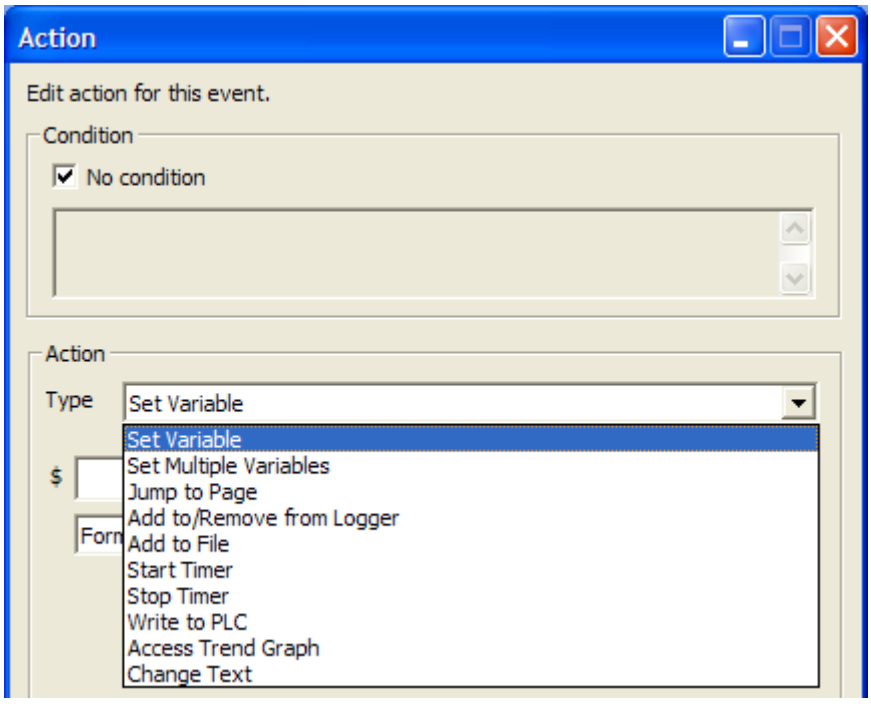
Events and Event Handling

Most graphical user interfaces facilitate their interactivity through the use of events and event handlers. An event defines a specific condition that has occurred (e.g. a button was clicked, a variable changed, a timer ticked, etc…). An event handler is an action or series of actions to perform when the event occurs (i.e. an event handler "handles" the event). The CUPANEL Editor uses the Event Handler Control to bind events and event handlers to facilitate this functionality.



The Event Handler Control is capable of "handling" four different events:

1. When Page Loaded – Occurs whenever a Page is shown on the screen.
2. When Timer Ticked – Occurs whenever a timer's interval elapses.
3. When Variable Changed – Occurs whenever a variable's value is updated.
4. When Button Clicked – Occurs whenever a button is pressed.



The Event Handler Control is capable of executing 10 different actions when an event occurs:

1. Set Variable – Updates a variable with a new value.
2. Set Multiple Variables – Update more than one variable with new values
3. Jump to Page – Transition to a specific page

4. Add to/Remove from Logger – Add a message to the Logger, or clear the log.
5. Add to File – Append data to a specified file.
6. Start Timer – Make a timer begin counting
7. Stop Timer – Make a timer stop counting
8. Write to PLC – Write to a specific register on a PLC
9. Access Trend Graph – Starts or stops a Trend Graph.
10. Change Text – Updates a control's text.

Each action has its own unique set of options, as each action is unique in its functionality.

The Event Handler Control can also place a condition and a repeat limitation on the action. The condition can be a formula restricting when the action can be executed. The repeat limitation specifies how often an action can be performed.

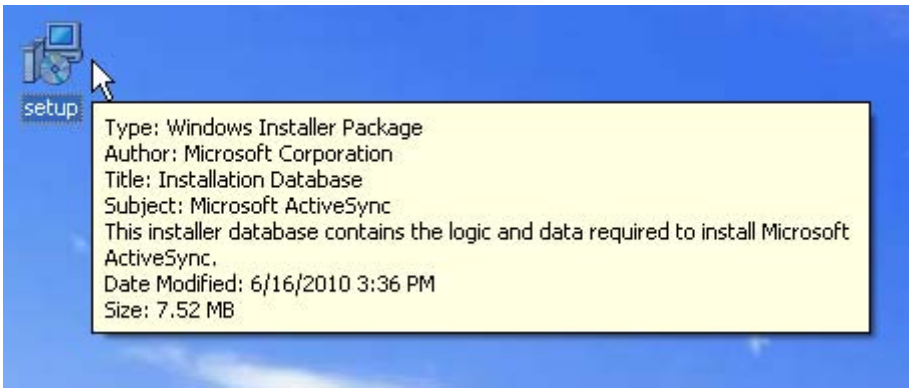
MEMO

Software Installation

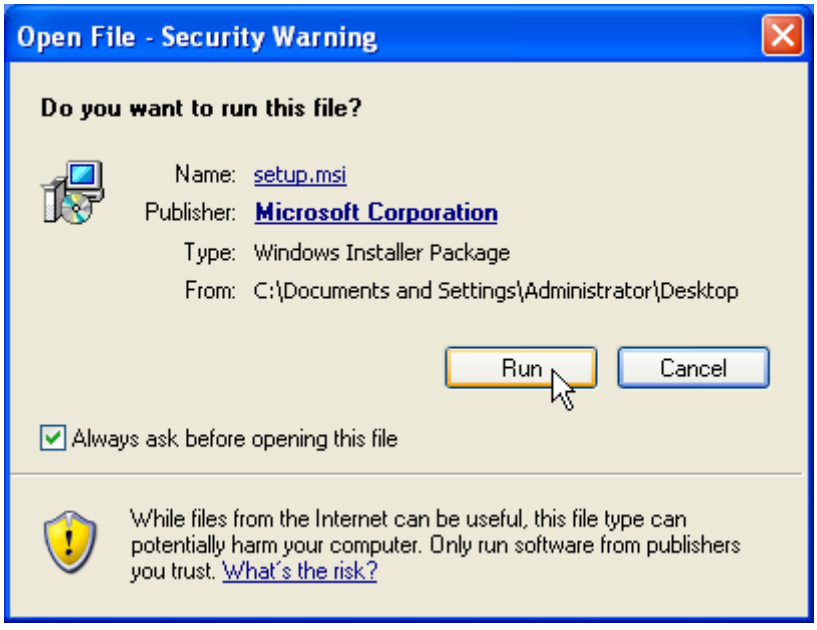
Installing ActiveSync (Windows XP)

If you are running Windows XP, please perform the following procedure to install ActiveSync.

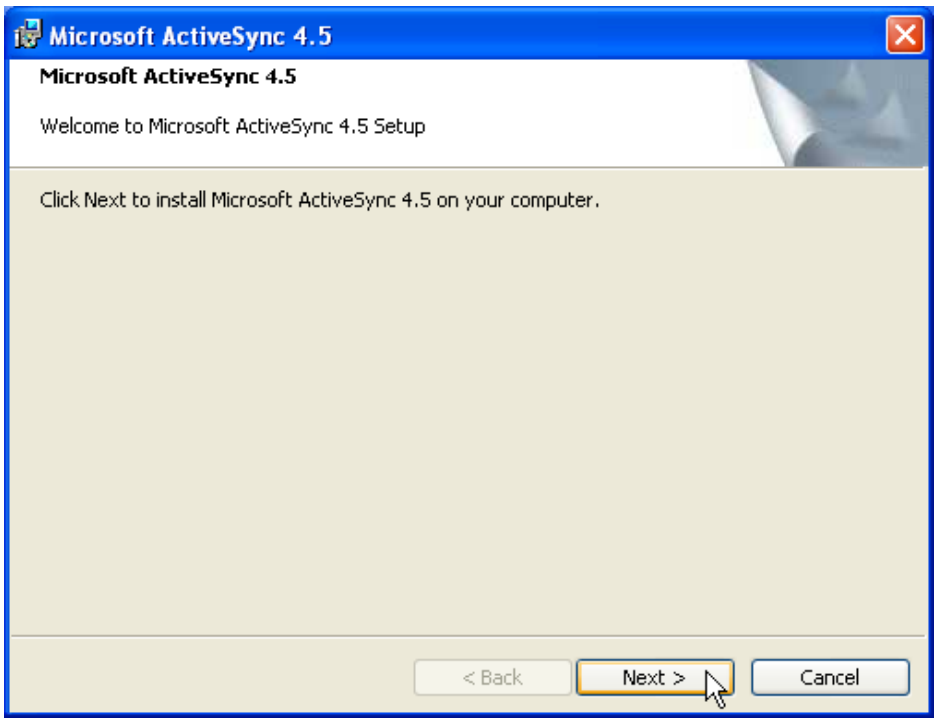
1. Download ActiveSync – At the time of this writing, the latest version was 4.5 and could be downloaded from http://www.microsoft.com/windowsmobile/en-us/downloads/microsoft/activesync-download.mspx.


setup
Type: Windows Installer Package
Author: Microsoft Corporation
Title: Installation Database
Subject: Microsoft ActiveSync
This installer database contains the logic and data required to install Microsoft ActiveSync.
Date Modified: 6/16/2010 3:36 PM
Size: 7.52 MB

2. Run the downloaded file.


Open File - Security Warning
Do you want to run this file?
Name: setup.msi
Publisher: Microsoft Corporation
Type: Windows Installer Package
From: C:\Documents and Settings\Administrator\Desktop
Run
Cancel
Always ask before opening this file
While files from the Internet can be useful, this file type can potentially harm your computer. Only run software from publishers you trust. What's the risk?

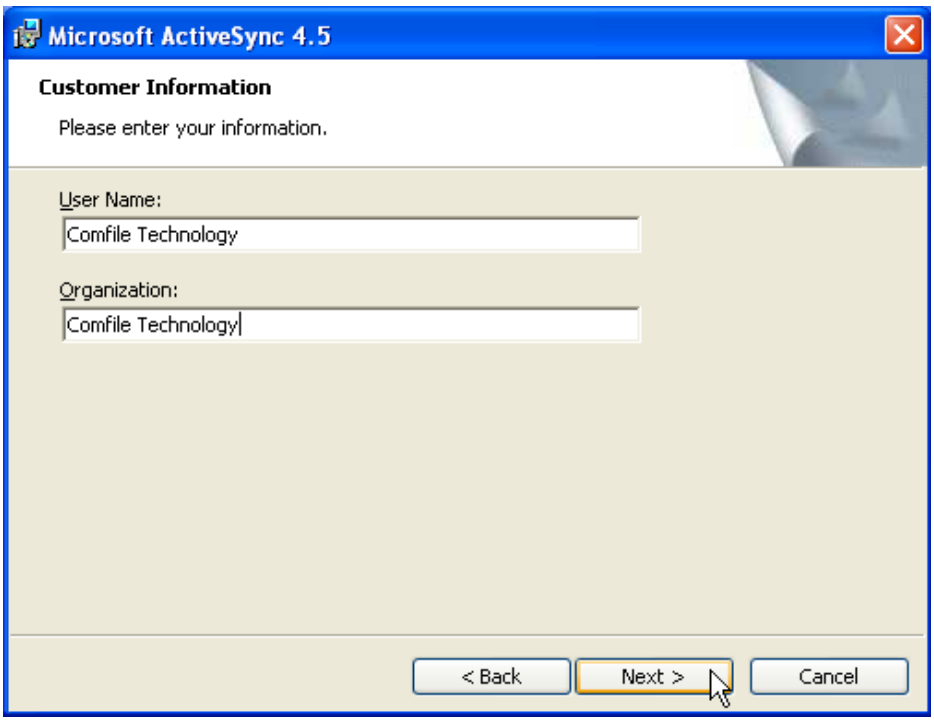
3. If a "Security Warning" dialog box appears, click the "Run" button.


Microsoft ActiveSync 4.5
Microsoft ActiveSync 4.5
Welcome to Microsoft ActiveSync 4.5 Setup
Click Next to install Microsoft ActiveSync 4.5 on your computer.
< Back
Next >
Cancel

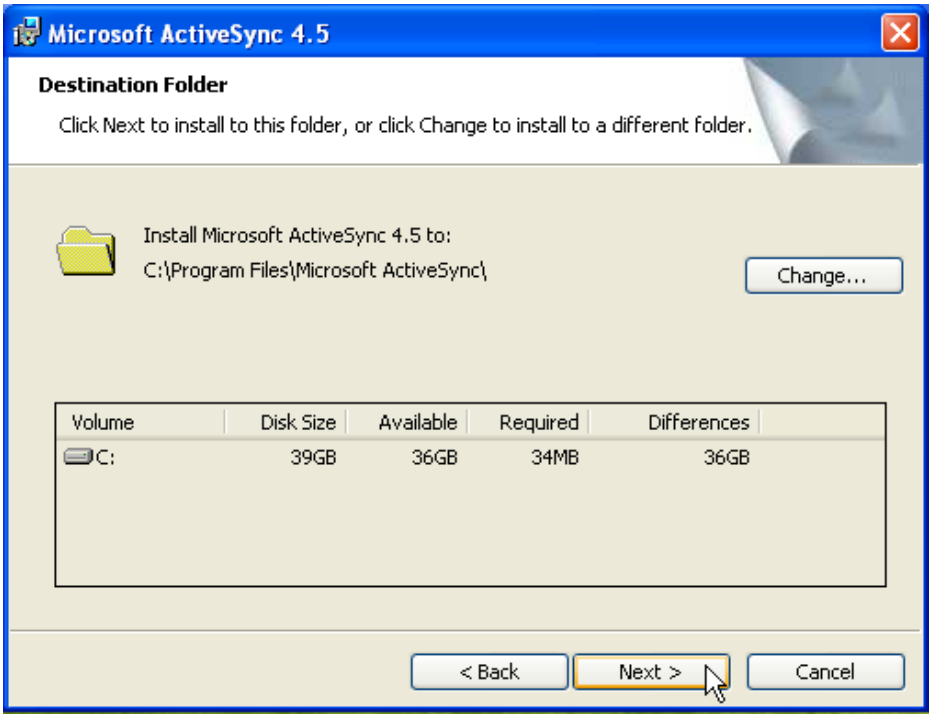
4. On the following screen, click the "Next" button.

Microsoft ActiveSync 4.5
License Agreement
Please read the following license agreement carefully.
MICROSOFT SOFTWARE LICENSE TERMS
MICROSOFT ACTIVESYNC 4.5
These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you received it, if any. The terms also apply to any Microsoft
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
< Back
Next >
Cancel

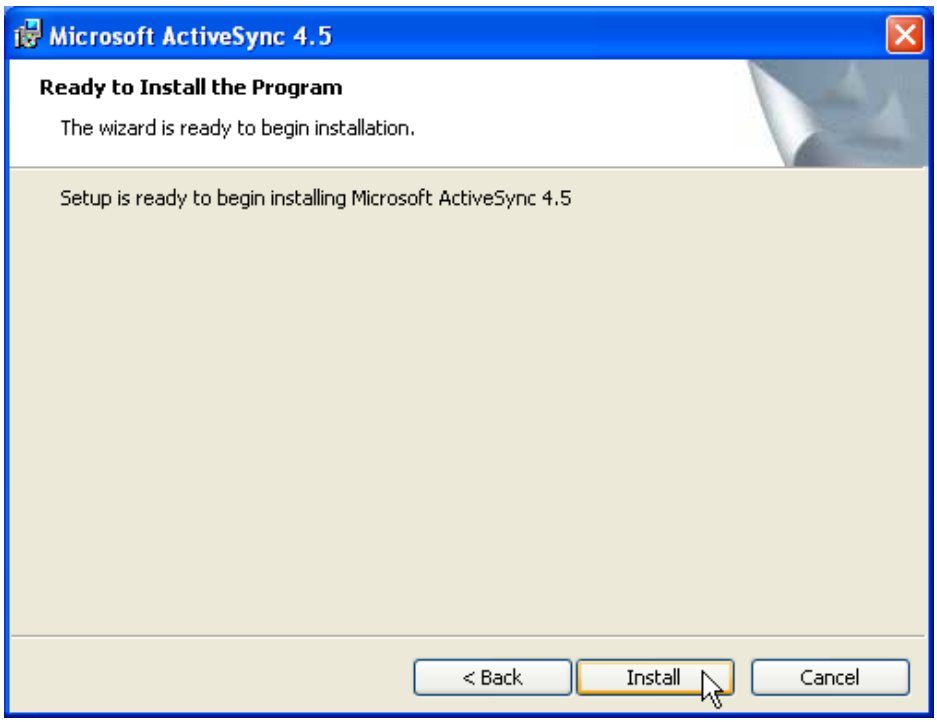
5. Read the license agreement and, if you agree, accept the license agreement and click the "Next" button.



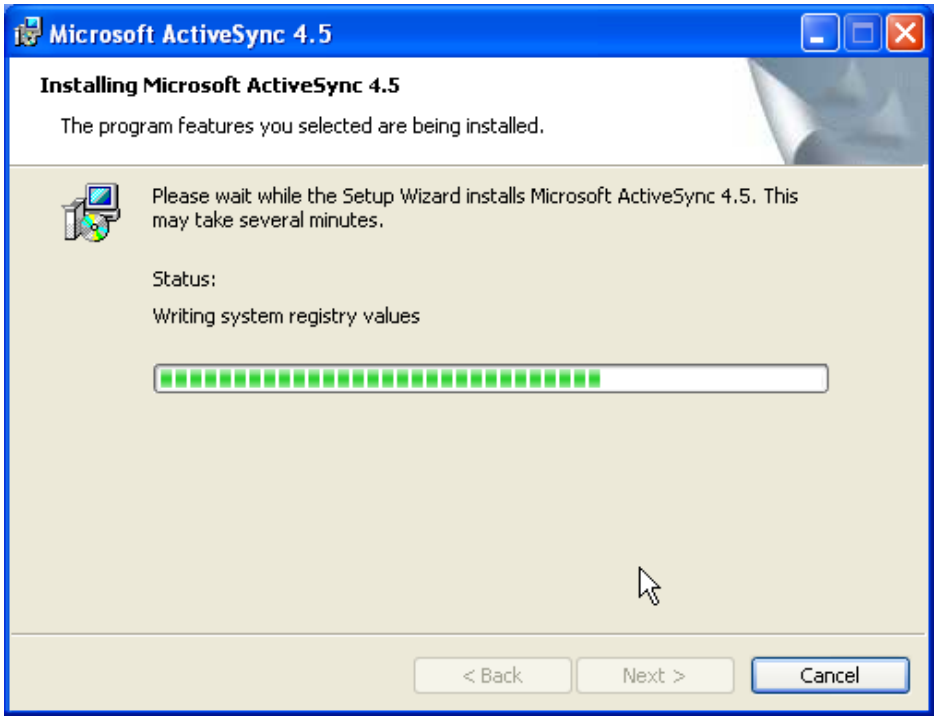
6. On the "Customer Information" dialog, enter the appropriate information in the "User Name" and "Organization" text boxes. Then click the "Next" button.



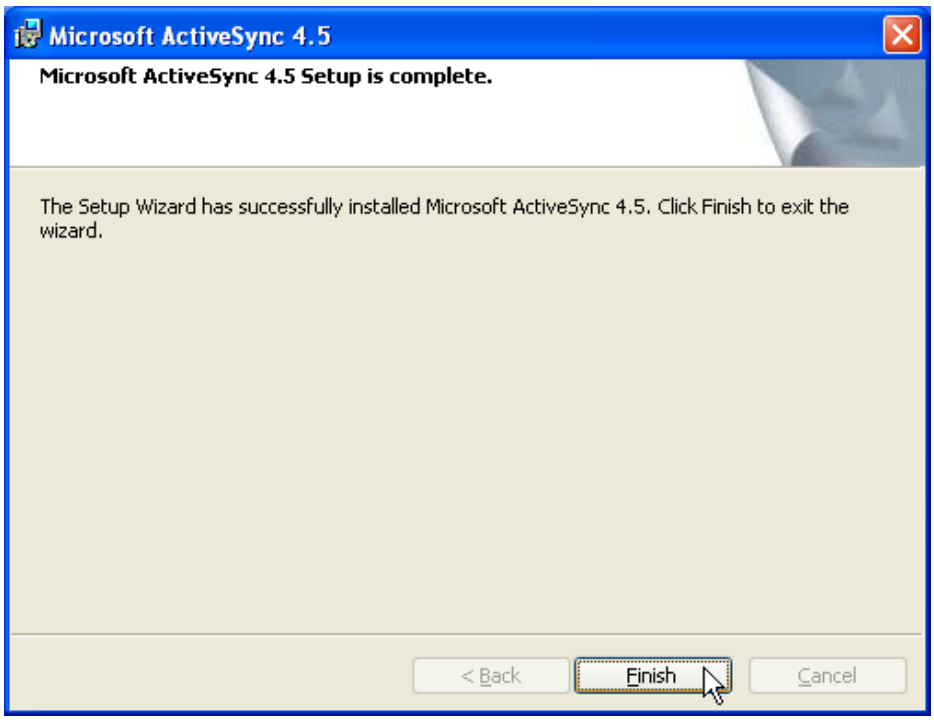
7. On the "Destination Folder" dialog, accept the default or change the destination folder. Then click the "Next" button.


Microsoft ActiveSync 4.5
Ready to Install the Program
The wizard is ready to begin installation.
Setup is ready to begin installing Microsoft ActiveSync 4.5
< Back
Install
Cancel

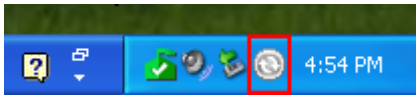
8. A dialog will appear telling you that you are ready to install the program. Click the "Install" button.

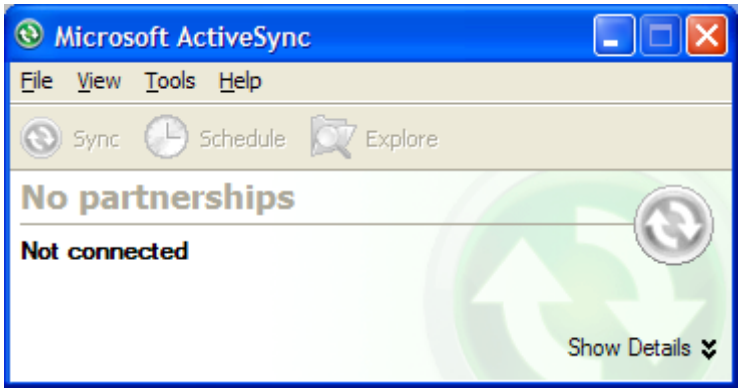

Microsoft ActiveSync 4.5
Installing Microsoft ActiveSync 4.5
The program features you selected are being installed.
Please wait while the Setup Wizard installs Microsoft ActiveSync 4.5. This may take several minutes.
Status:
Writing system registry values
< Back
Next >
Cancel

9. A new dialog with a progress bar will then appear showing the status of the installation. Wait for it to complete.


Microsoft ActiveSync 4.5
Microsoft ActiveSync 4.5 Setup is complete.
The Setup Wizard has successfully installed Microsoft ActiveSync 4.5. Click Finish to exit the wizard.
< Back
Finish
Cancel

10. When installation is complete, a dialog will appear saying "Microsoft ActivSync 4.5 Setup is complete". Click the "Finish" button.



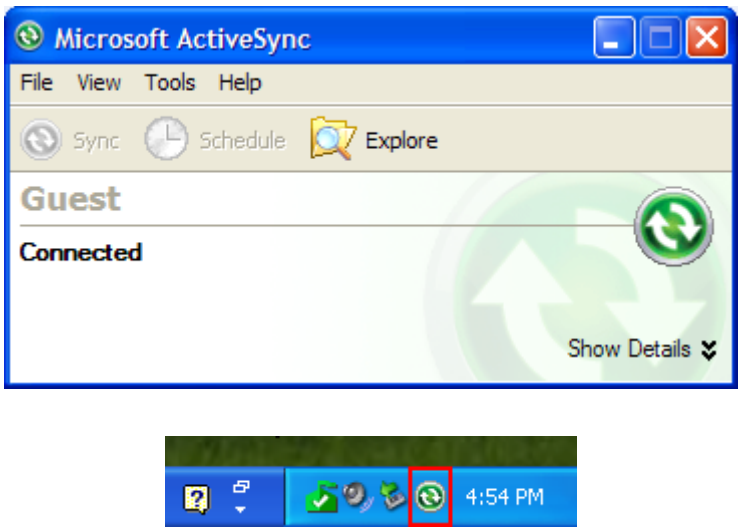


11. ActiveSync is now installed, and you should see the ActiveSync icon in your system tray. If you double-click the system tray icon, the ActiveSync window will display showing a status of "Not Connected."

12. Using a USB cable, connect the CUPANEL to the PC. You will probably hear a few sounds from the PC and the CUPANEL as the connection is established.

New Partnership
Set Up a Partnership
Before you can synchronize information between your mobile device and this computer, you must set up a partnership between them.
Would you like to set up a partnership?
Yes
Set up a partnership so that I can synchronize information between my device and this computer.
No
I don't want to synchronize information. Set up my device as a guest so that I can copy or move information between my device and this computer.
< Back
Next >
Cancel
Help

13. ActiveSync will then prompt you to create a partnership between the PC and the CUPANEL. Make your selection. If you're not sure, just choose "No". Then click the "Next" button.

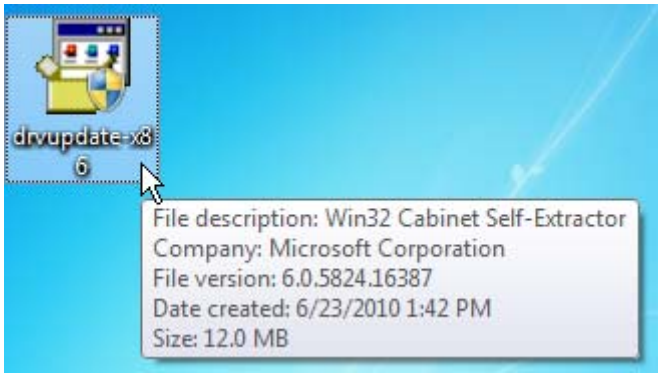


14. ActiveSync will then show a status of "Connected", and the ActiveSync system tray icon will change indicating the CUPANEL is connected to the PC. Click the "Explore" icon.

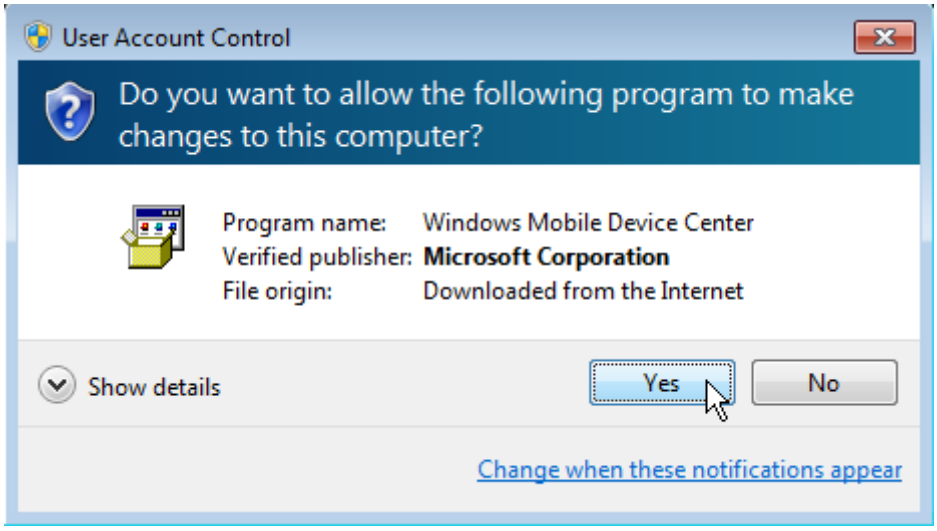
Installing Windows Mobile Device Center (Windows Vista, 7)

If you are running Windows Vista or Windows 7, please perform the following procedure to install Windows Mobile Device Center.

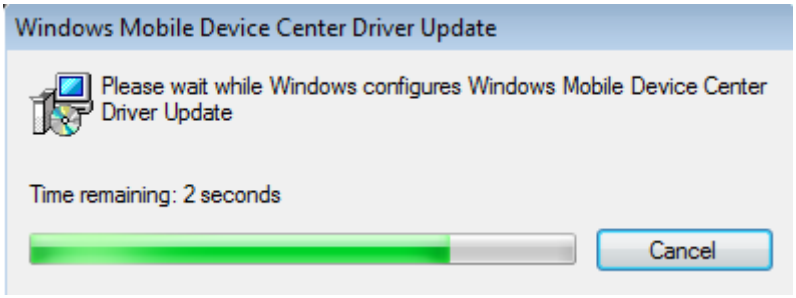
1. Download Windows Mobile Device Center. At the time of this writing, the latest version was 6.1 and could be downloaded from http://www.microsoft.com/downloads/details.aspx?FamilyId=46F72DF1-E46A-4A5F-A791-09F07AAA1914&displaylang=en



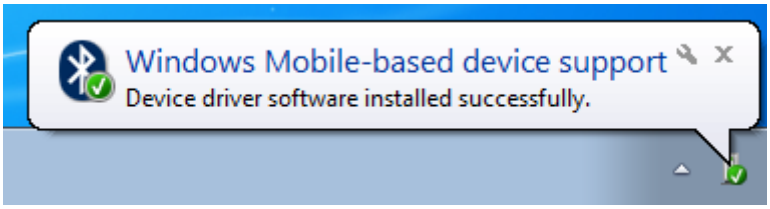
2. Run the downloaded file.


User Account Control
Do you want to allow the following program to make changes to this computer?
Program name: Windows Mobile Device Center
Verified publisher: Microsoft Corporation
File origin: Downloaded from the Internet
Show details
Yes
No
Change when these notifications appear

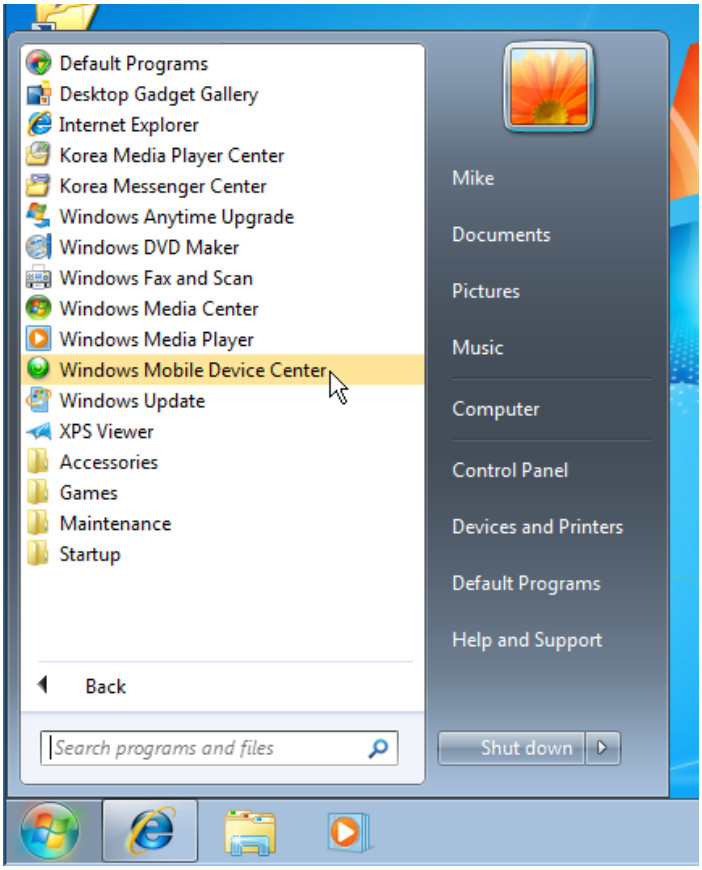
3. If you are presented with a "User Account Control" dialog, click the "Yes" button.


Windows Mobile Device Center Driver Update
Please wait while Windows configures Windows Mobile Device Center Driver Update
Time remaining: 2 seconds
Cancel

4. Windows Mobile Device Center will begin installing. Wait for it to finish.



5. When the installation is finished, a message will appear in the system tray telling you that the installation was successful.



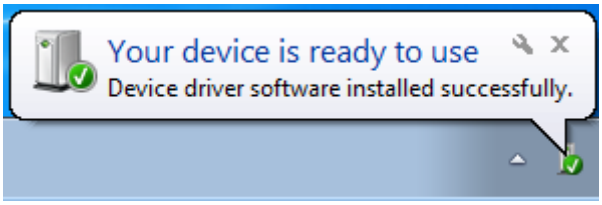
6. Run "Windows Media Device Center" from the Windows Start Menu.

Windows Mobile Device Center
MICROSOFT SOFTWARE LICENSE TERMS
MICROSOFT WINDOWS MOBILE DEVICE CENTER 6.1
These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you received it, if any. The terms also apply to any Microsoft
updates,
supplements,
Internet-based services, and
Print
Accept
Decline

7. Read the license agreement and, if you agree, click the "Accept" button.

8. Windows Mobile Device Center will open, and will indicate a status of "Not Connected".

9. Using a USB cable, connect the CUPANEL to the PC.



10. Windows will begin installing a driver for the CUPANEL. When it is finished, a message will display in the system tray saying "Your device is ready to use."

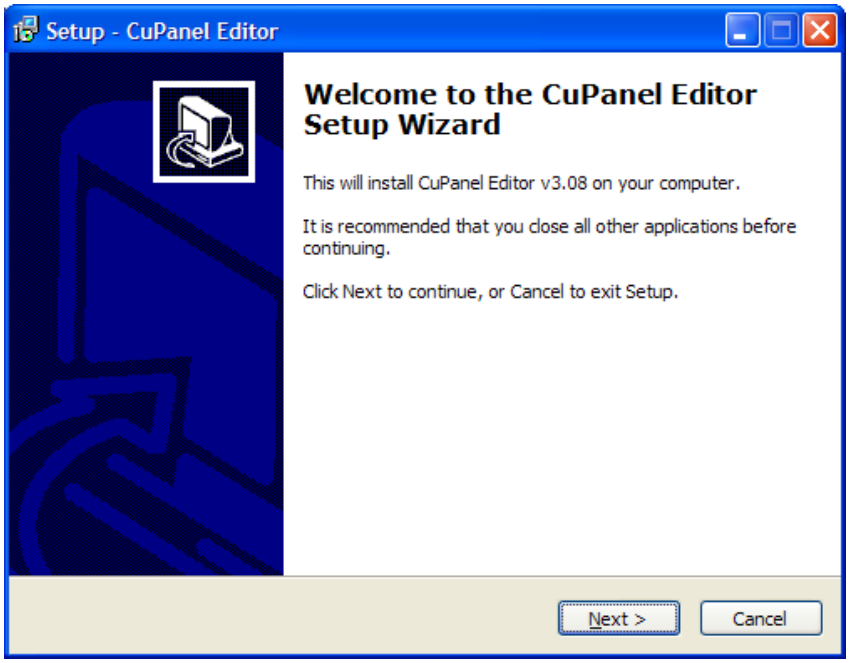
Windows Mobile Device Center
Home
Windows Mobile
Set up your device
Get Outlook contacts, calendar, e-mail and other information on your device.
Connect without setting up your device
Connected

11. Windows Mobile Device Center will begin connecting with the CUPANEL. When it is finished, it will display a status of connected.

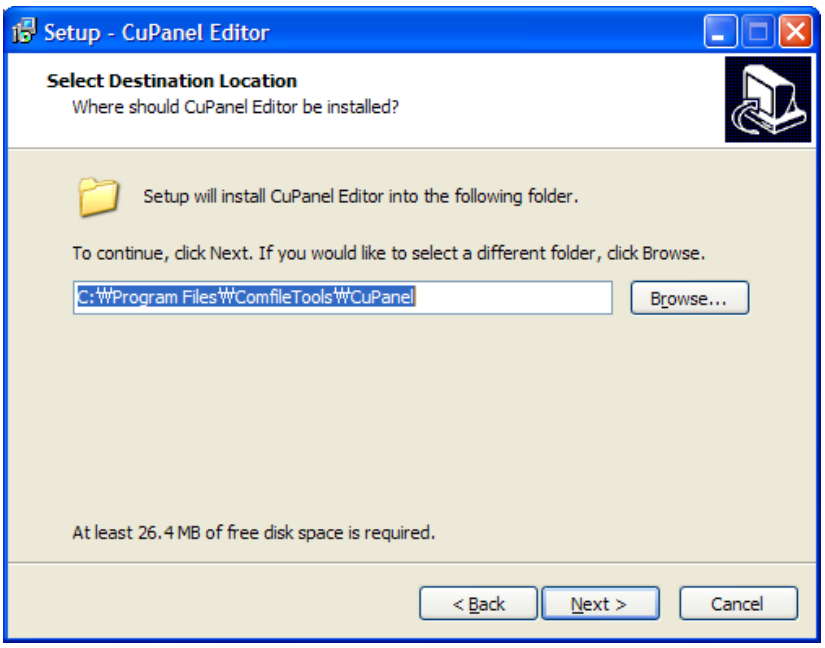
Installing the CUPANEL Editor

Follow the following instructions to download and install the CUPANEL Editor. These instructions will describe the procedure for Windows XP, but the procedure is similar for Windows Vista and Windows 7.

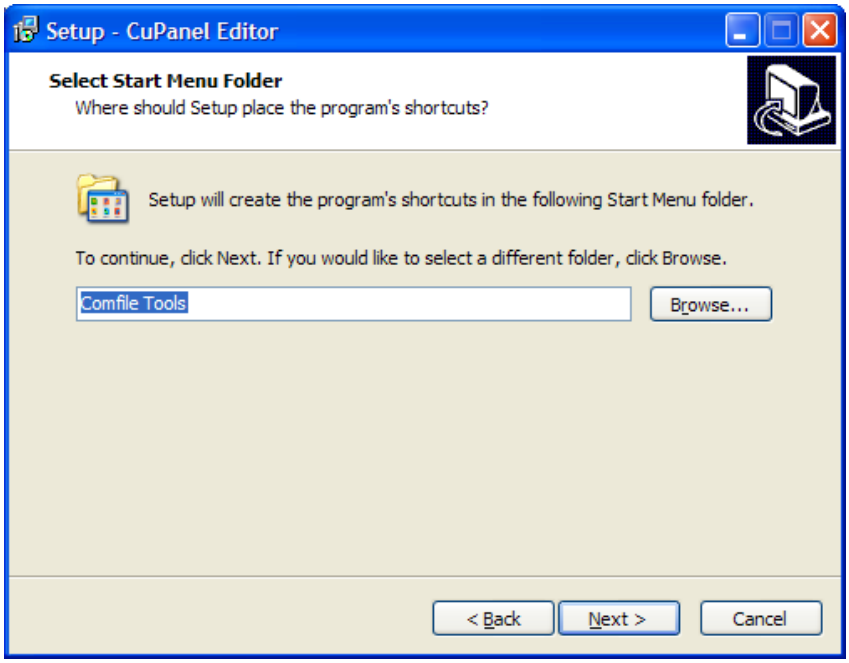
1. Download the CUPANEL Editor from http://www.cubloc.com/data/08.php.


Setup - CuPanel Editor
Welcome to the CuPanel Editor Setup Wizard
This will install CuPanel Editor v3.08 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

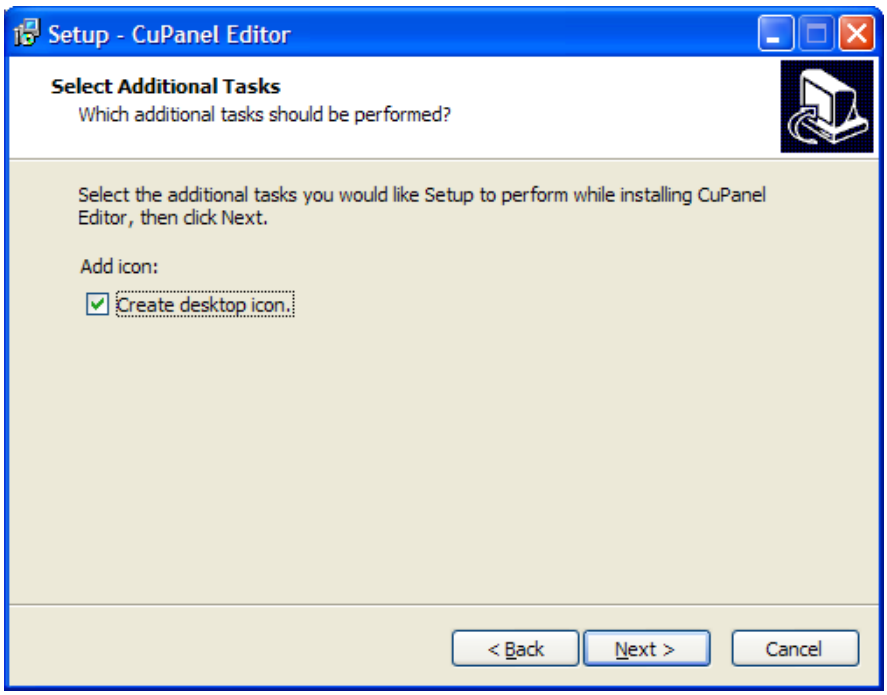
2. Run the downloaded file and the dialog above will appear. Click the "Next" button.


Setup - CuPanel Editor
Select Destination Location
Where should CuPanel Editor be installed?
Setup will install CuPanel Editor into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:₩Program Files₩ComfileTools₩CuPanel
Browse...
At least 26.4 MB of free disk space is required.
< Back
Next >
Cancel

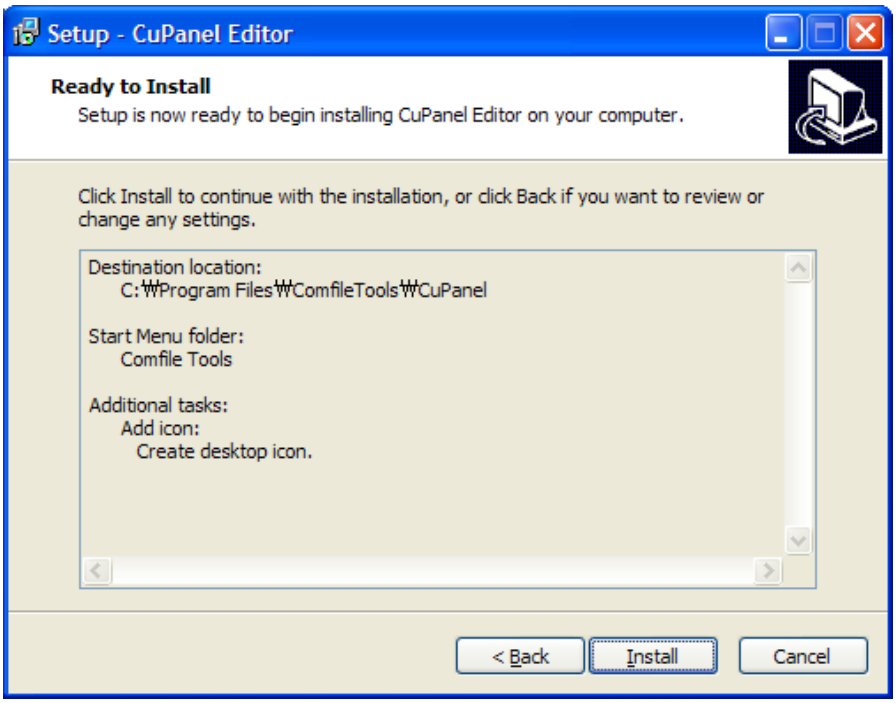
3. The installation program will then ask you to specify the location where you would like the CUPANEL Editor to be installed. Keep the defaults or make changes to your liking and click the "Next" button.


Setup - CuPanel Editor
Select Start Menu Folder
Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.
Comfile Tools
Browse...
< Back
Next >
Cancel

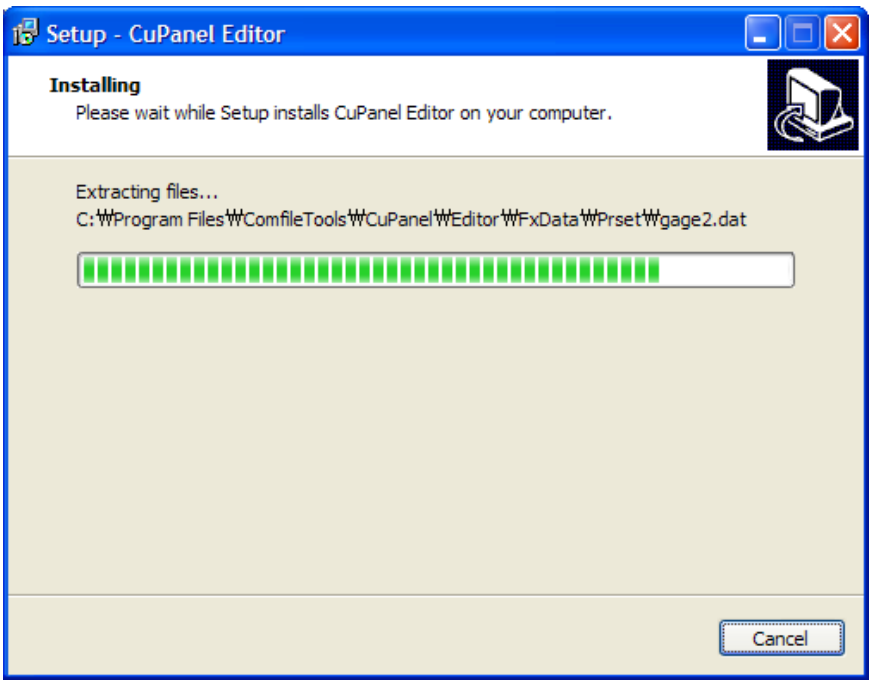
4. The installation program will then ask you to specify a Start Menu folder. Keep the defaults or make changes to your liking and click the "Next" button.


Setup - CuPanel Editor
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing CuPanel Editor, then click Next.
Add icon:
Create desktop icon.
< Back
Next >
Cancel

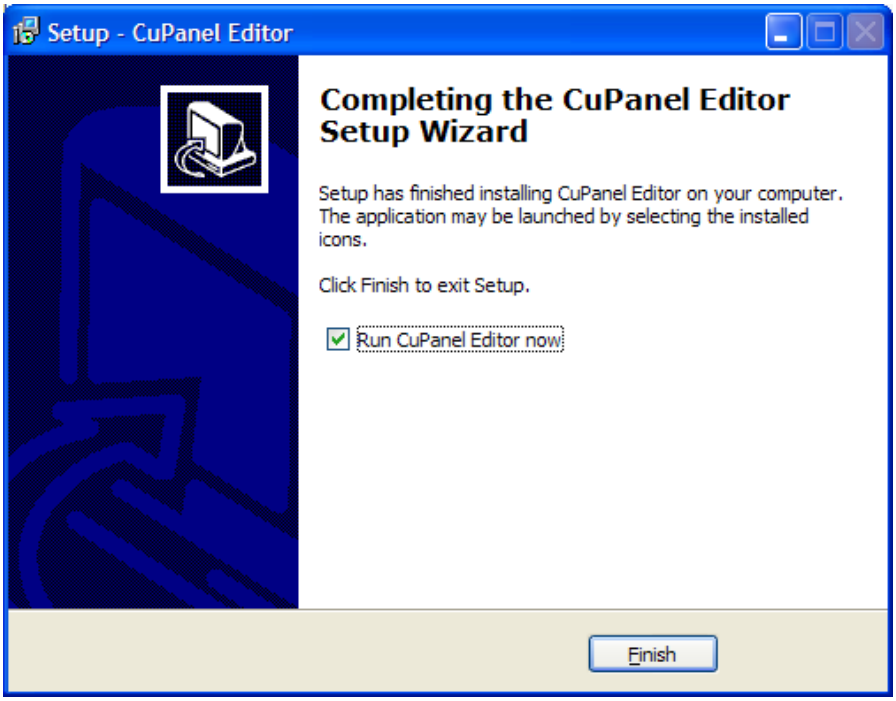
5. The installation program will then ask you if you would like to create a desktop icon. Keep the defaults or make changes to your liking and click the "Next" button.


Setup - CuPanel Editor
Ready to Install
Setup is now ready to begin installing CuPanel Editor on your computer.
Click Install to continue with the installation, or click Back if you want to review or change any settings.
Destination location:
C:₩Program Files₩ComfileTools₩CuPanel
Start Menu folder:
Comfile Tools
Additional tasks:
Add icon:
Create desktop icon.
< Back
Install
Cancel

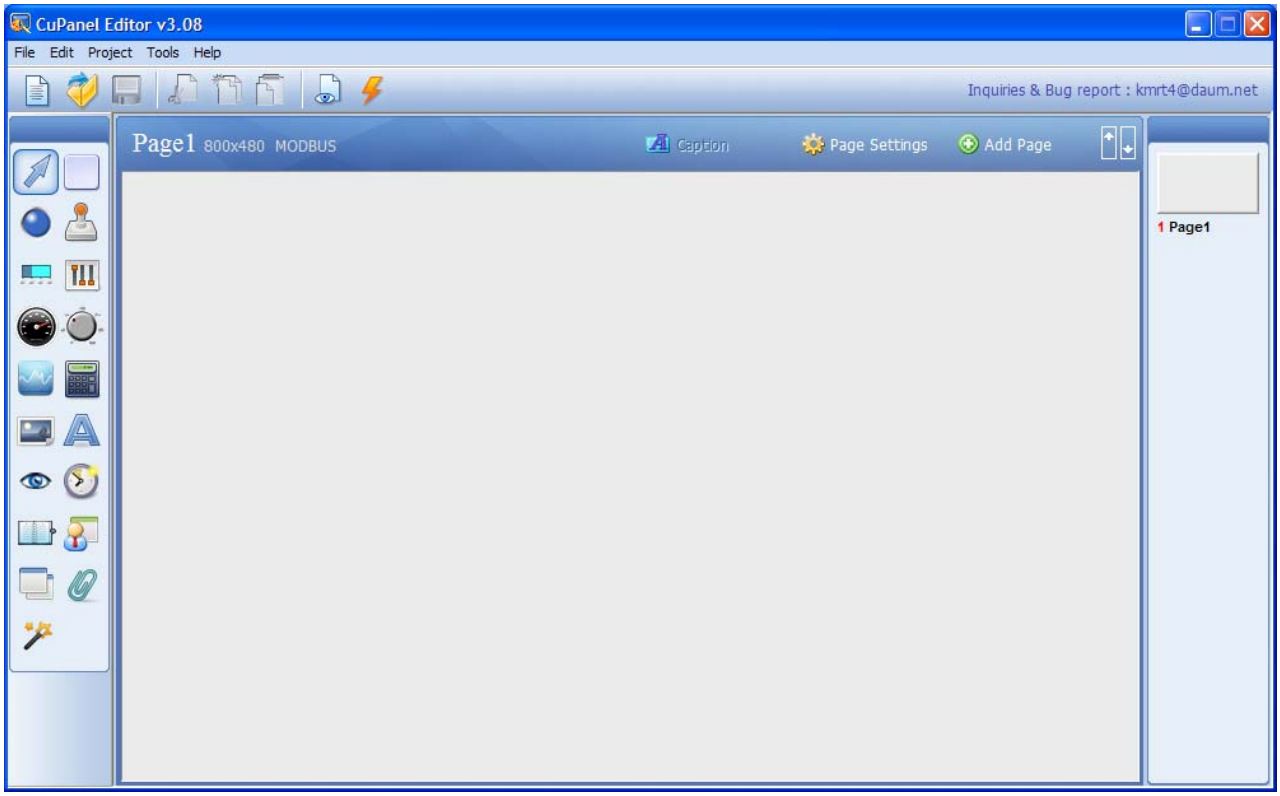
6. The installation program will then inform you that all it is ready to install. Click the "Install" button.



7. The installation program will then begin copying the necessary files to your computer. Wait for it to finish.


Setup - CuPanel Editor
Completing the CuPanel Editor Setup Wizard
Setup has finished installing CuPanel Editor on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Run CuPanel Editor now
Finish

8. When the installation is finished, the following screen will appear. You can now run the CUPANEL editor. Click the "Finish" button.



9. When the CUPANEL Editor is run, the CUPANEL Editor's main window will appear.